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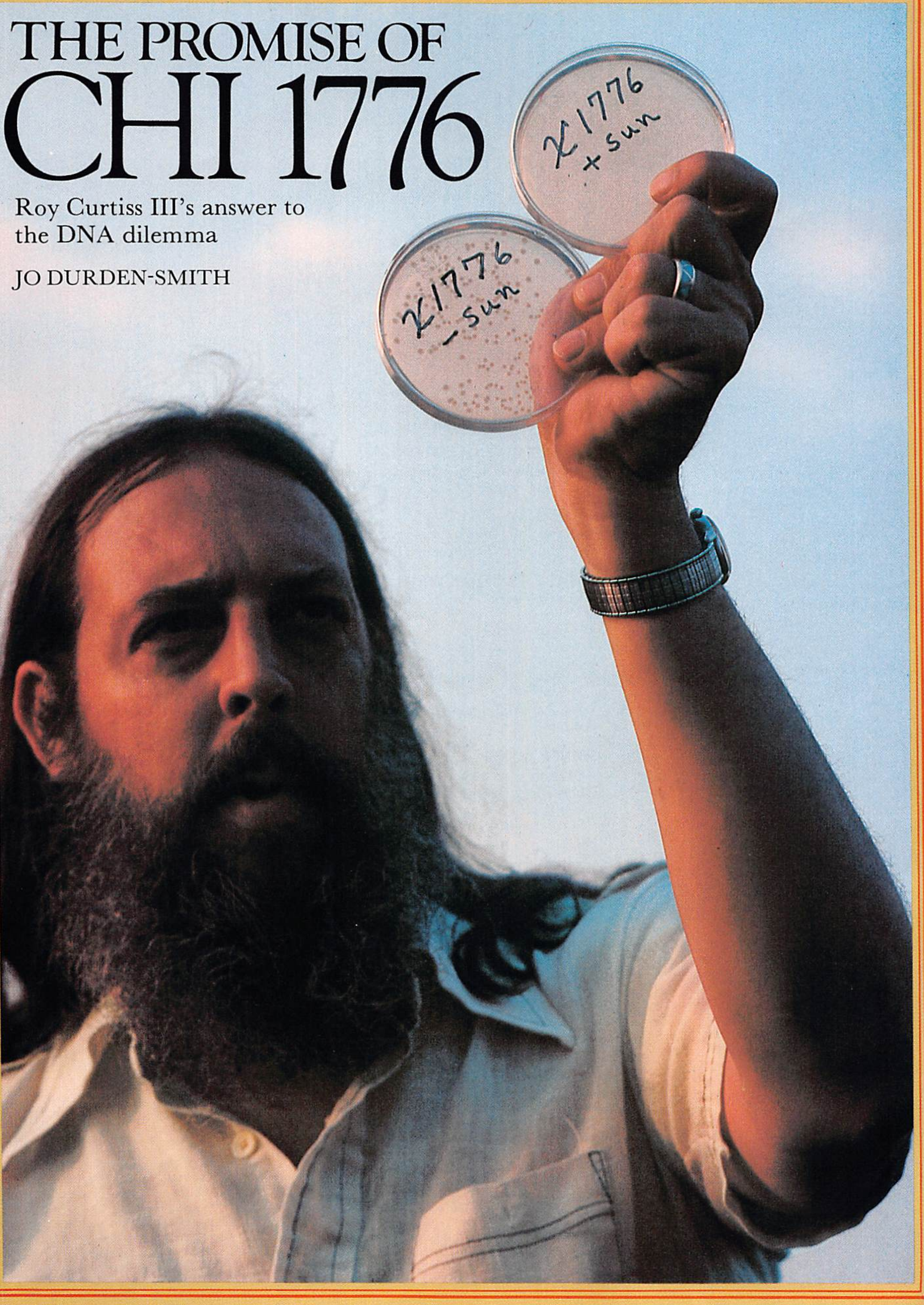
THE PROMISE OF CHI 1776

Roy Curtiss III's answer to the DNA dilemma

JO DURDEN-SMITH



PHOTOGRAPHS BY RUSSELL MUNSON

Curtiss displays two culture dishes containing *chi 1776* colonies to show the new bacteria's fail-safe inability to proliferate outside the laboratory. Colonies exposed to sun have died, while unexposed colonies go on multiplying.

In Birmingham, Alabama, as elsewhere, the processes and purposes of science are invisible. The young, to be sure, as they spill out of the singles bars south of the city on this fine night, have a "position" on pollution and nuclear proliferation. The steelworkers of Bessemer and Fairfield, to the west, as they turn off the television, may brood about the accidents of their trade, but hardly any of them have even a rudimentary grasp of modern science beyond the kind that comes wrapped in a technology, with an immediate impact on their lives. The controversy now raging among scientists over recombinant DNA would strike most of them as no less inscrutable than a debate between medieval theologians over the number of angels on the head of a pin. Indeed, they might be surprised that one of the central figures in the recombinant DNA controversy is a tall, tireless microbiologist at their own University of Alabama in Birmingham. His name is Roy Curtiss III, and at midnight, while the world sleeps, he is routinely trudging back to work across the School of Dentistry's parking lot.

Curtiss's beard, long hair, and deep-set eyes give him the look of one of those dark, driven men in Dickens's industrial novels. Born in New York City in 1934, he first became interested in science when he started breeding chickens in upstate New York at the age of 12. ("I like to grow things. I started with sunflowers and went on to chickens. By the time I was 14, I was doing blood-testing, using artificial insemination, and sponging up information from books, pamphlets, bulletins, anything I could find.") After graduating from Cornell University in 1956, he probably would have become a chicken breeder if he had had the $250,000 he thought necessary to set up a breeding hatchery ("I tend to think big"). But he didn't have the money, nor was he impressed by the people he met in poultry husbandry. So instead of taking a postgraduate degree in agriculture, he took a two-year job after Cornell as a technician at the Brookhaven National Laboratory on Long Island, where he was introduced to microbial cell genetics, and then went on to the University of Chicago for a Ph.D. After a stint at the Oak Ridge National Laboratory in Tennessee, he moved to Birmingham in 1972.

Now, at 42, he presides over an open-plan laboratory, designed to his specifications, and a team of junior professors, postdoctoral fellows (including his wife, Josie Clark), graduate students, and technicians from Poland, Taiwan, Brazil, India, Japan, and Chile as well as from the United States. As professor of microbiology, he is responsible for about $750,000 spent each year on research, equipment, and salaries. He is also responsible for the general direction of the laboratory's work: what new expertise or equipment should be brought in; what new research projects should be undertaken, so as not to overlap with work being done elsewhere; what conferences and meetings should be attended. He has to promote and protect the scientific careers of the members of his group. He has to chair seminars, attend faculty meetings, write grant applications and reports, and prepare the results of experiments for publication. To do all this (and his own experimental work), he spends 12 to 14 hours a day in the laboratory—from noon till the small hours of the morning.

Curtiss warned early about the dangers involved in what has been called the most important breakthrough in science since the splitting of the atom. For more than two years now, he and his team have been constructing, testing, and analyzing a special strain of bacteria for use in the revolutionary new genetic transplantations. And Curtiss thinks he knows as much as a scientist now can know about the transplantation technique's comparative risk or safety. Yet, such are the barriers of knowledge and specialization between him and the steelworkers, between him and the young, that he cannot reach them with what he knows. Instead, Curtiss finds himself having to face new public emotions: resentment, ignorance that is suddenly embattled, and a diffuse fear of the unknown.

DAVID SCHARF

A colony of *E. coli* magnified 18,000 times

The story of recombinant DNA began in the early 1970s. Scientists at Stanford and the University of California at San Francisco devised a relatively simple way of transferring into a single-celled organism—a bacterium called *Escherichia coli* (*see box*)—genetic material from other organisms. The hereditary information of *E. coli* (the DNA that regulates the manufacture of its 3,000 or 4,000 proteins and programs its evolutionary destiny) comes in two forms: a long, convoluted, continuous strand—the chromosome—and small, independent circles, made up of only a few genes, called plasmids. These plasmids, discovered in 1953, move around from bacterium to bacterium, and scientists had long been interested in them, partly because they provided small, easy-to-handle genetic systems, and partly because they were associated, in many cases, with antibiotic resistance. Now they were called upon to do other duty.

E. coli gives up its genes very easily. A detergent was used to burst open the bacteria, which spill out their genetic material. Plastic test tubes of their DNA were then placed in a centrifuge for 24 hours to separate the plasmids from the rest of the DNA. Under ultraviolet light, a dye showed the two separated bands of DNA glowing clearly. The layer of plasmid DNA was now drawn off by a hypodermic needle pushed through the wall of the tube. Next the plasmids were split open by a cutting enzyme that the

JO DURDEN-SMITH is the author of *Who Killed George Jackson?* He has produced, directed, and written films for British TV and contributed articles to British, Canadian, and American magazines.

bacteria normally turn against the viruses that invade them. Then they were mixed with fragments of DNA from other organisms—like frog or yeast cells—that had been cut away from their parent chromosome in the same way. To the mixture was added a purified binder enzyme. With its catalytic encouragement, a small number of plasmids were able to pick up a piece of the foreign DNA on the sticky ends left by their cuts. Now, integral, but part bacterial and part frog or yeast in their genetic information, they were ready to be winnowed out and smuggled back into a specially prepared batch of *E. coli.* Once inside, they replicated along with the cells they were aboard, making exact, multiple copies of the stranger gene, as well as their own genes, every 20 minutes. It was a breakthrough, and it suggested all sorts of possible uses: cloning and examination of *human* genes in *E. coli*, transferring genes for fixing nitrogen to cash crops that currently need expensive fertilizer, and growing in *E. coli* factories important gene products like insulin.

It was 1972, and Roy Curtiss was then 37. He had just moved to the rapidly expanding teaching and hospital complex of the University of Alabama in Birmingham as professor of microbiology, bringing with him from Oak Ridge a number of his postdoctoral fellows, and an intimate knowledge of *E. coli.* Before the California discoveries, bacterial genetics was a field in retreat. Most researchers felt that *E. coli*, the most studied organism on earth, had given up most of its important secrets. And many scientists were now interested in examining in higher systems, closer to man, the information it had yielded about the workings of the cell. Not so Roy Curtiss. His move to Alabama was a step upward, but it also meant that he could begin to look at the biochemical and genetic basis of the origins of diseases in a clinical setting. His feeling—correct, as it turned out—was that bacterial plasmids conferring resistance to antibiotics would soon be rampant, and that a new approach would have to be tried in dealing with bacterial diseases like gonorrhea and the infections that kill many young leukemia patients. He wanted the opportunity given him by Claude Bennett, the department chairman, to build up from scratch a laboratory aimed at investigating these problems, using genetic techniques.

The California experiments, then, touched Curtiss closely. He was an expert on *E. coli*, its plasmids and viruses and normal biochemical mechanisms, and the fact that the new technology used *E. coli* immediately suggested to him a new way ahead. At the time, in between the business of recruiting and supervising the building of his new laboratory, he was considering a bacterium that, in his words, "probably costs human beings more time and money than any other microorganism": *Streptococcus mutans*, which, because of its ability to convert sugar into a sticky substance and an acid, can cling to the enamel of the teeth and leech out their minerals, causing tooth decay. (*S. mutans* is a low-grade pathogen, but it is related to an important group of streptococci that cause meningitis, scarlet fever, and rheumatic fever, among other diseases.) First he had tried, by standard techniques, to encourage *E. coli* to take up *S. mutans*'s plasmids whole, so that he could study, in a well-known cellular environment, their role in the production of the sticky substance, which seemed to be the sine qua non of *S. mutans*'s virulence. But, this having failed, he now began to look at the possibility of construct-

PATRICIA HALE

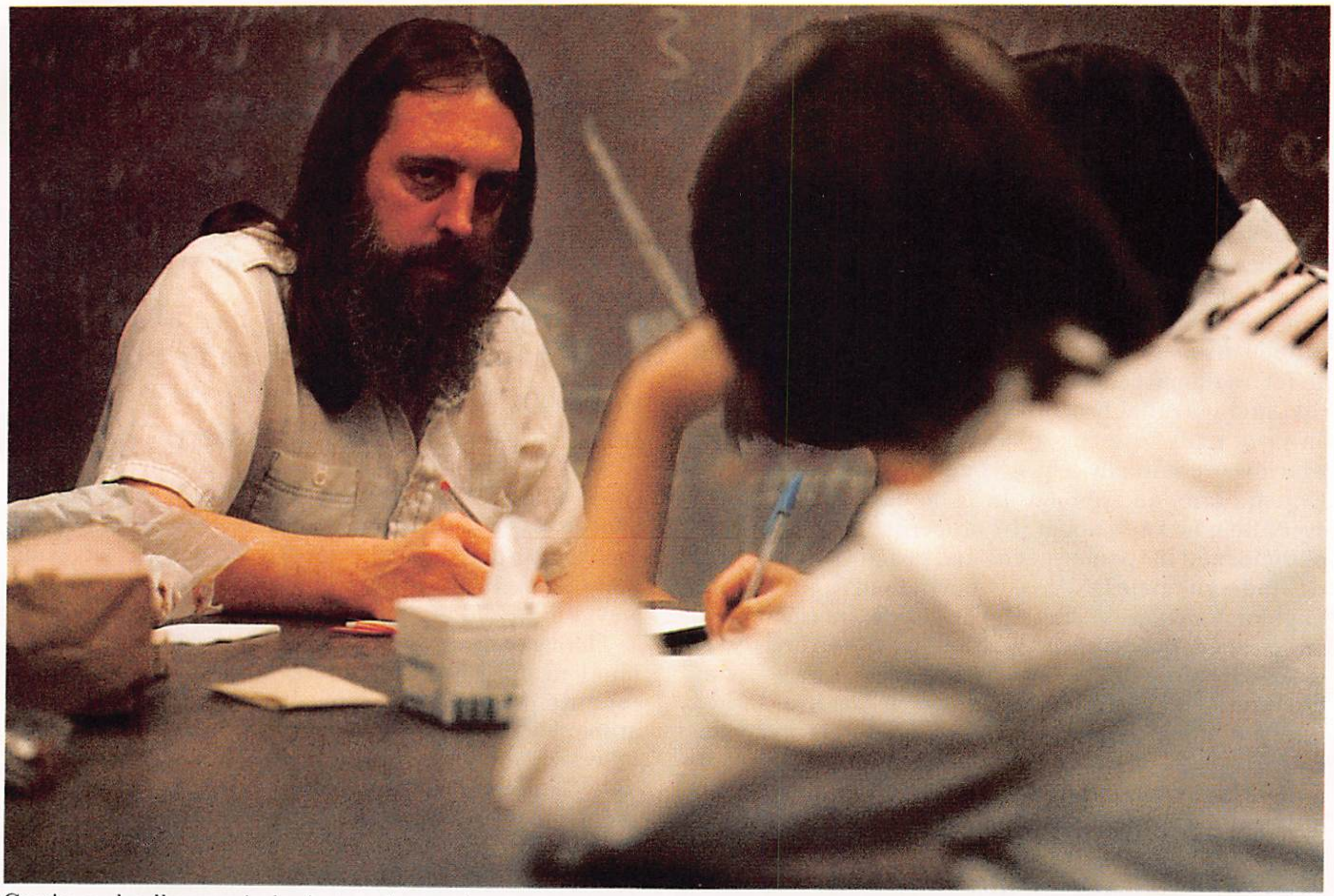
Origins of *E. coli*

What the bat is to baseball, sugar is to Cuba, and the rat is to psychology, a little bacterium called *Escherichia coli* is to the history of modern microbiology. Discovered by a German pediatrician named Theodor Escherich some 20 years after Pasteur had ushered in the germ theory of disease, and shown by him to be a natural inhabitant of the human colon, it is 500 times smaller than the average animal or plant cell and 60 billion times heavier than a water molecule. Although mostly rough-coated and harmless—we commonly have three or four strains resident in us, with some passing through—it has some virulent smooth-coated strains that can cause bacturemia, urinary tract disease, and diarrhea in humans. Montezuma's Revenge, for example, is not his, but *E. coli*'s.

The strain of *E. coli* almost universally used in the laboratory is *E. coli K12*, which was taken from a patient in Stanford, California in 1922. For the first 20 years of its life it was used locally for teaching and demonstration purposes. But then it was taken off the shelf by Nobel laureates Ed Tatum and Joshua Lederberg for experiments, first to demonstrate that radiation would induce mutation in bacteria, and second to show that bacteria could pass DNA to each other by a sexual process. This was the beginning of bacterial genetics. At the same time, the famous "phage"—or virus—group gathered around future Nobel laureates S. E. Luria, Max Delbrück, and Alfred Hershey (a group whose seminars at Cold Spring Harbor Roy Curtiss used to visit when he was a young technician at Brookhaven National Laboratory) decided to concentrate on the viruses that infected another strain of *E. coli*, designated B. They soon established that if two strains of one virus attack the same *E. coli*, they reproduce not only themselves, but also hybrid strains. The researchers also later found that the DNA of the virus was responsible for manufacturing not only its offspring's DNA, but also its protein coat. They thus brought together for the first time genetics, virology, and biochemistry, with *E. coli* as the pathfinder. This was the beginning of modern microbiology, and *E. coli K12* soon became, for reasons of uniformity, its instrument of choice.

Since then, work on *E. coli K12* has yielded up a great deal of what we know about the messenger, transfer, and production systems of the cell. Many of the Nobel prizes in physiology and medicine given over the last 20 years have been awarded for research on this little, laboratory-addicted bacterium. And whenever you walk into a microbiology laboratory, you will see growing in flasks and on culture dishes, producing themselves by the billions overnight, the mutated descendants of this 55-year-old strain.

—J.D.S.



Curtiss and colleagues in brainstorming session

ing a hybrid plasmid, part *E. coli* and part *S. mutans*, using the new recombinant technique. It was the next logical step, he believed, in the process of tracking down the gene products that made *S. mutans* a pathogen, and so, in the end, preventing the disease.

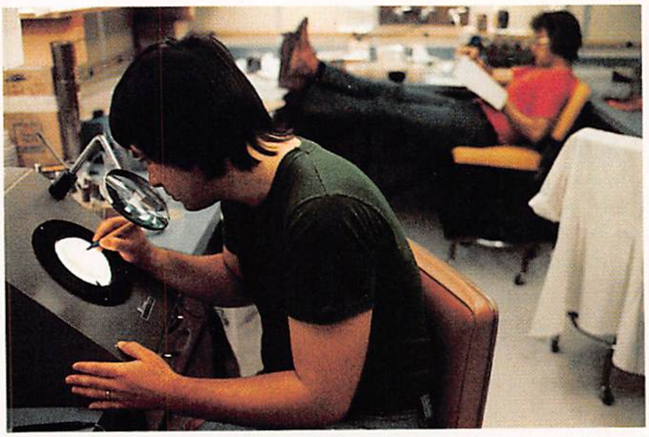
But then he paused. For by now, at conferences and in private communications, doubts had arisen about recombinants. In 1971, Stanford professor Paul Berg had been working on a rather awkward technique for transporting into *E. coli* DNA from a small monkey virus, *SV40*, that somewhere within its three genes carries the potential for causing cancer in mice and hamsters. And Berg had shelved the experiment, because he could not be sure, when others questioned him, that he would not make in the process a tumorogenic strain of *E. coli.* But now the technique had been made simpler. Given the availability of the new enzymes, one researcher said, "any high school student could do it." And this meant that scientists began to think very carefully about the implications and possible effects of what they were doing. *E. coli*, after all, is a natural inhabitant of humans, animals, plants, rivers, streams, and sewage. And since it was now proposed to cleave into it genes from a variety of viruses, and from a variety of organisms about which little was known, there was at least a possibility that the *E. coli* so adapted would be unwittingly given dangerous new chemical properties. Made virulent, for example, or given the ability to produce toxins or to degrade important substances in nature, it might then escape from the laboratory and spread rapidly among the natural bacterial population, causing disease and ecological havoc.

The more Roy Curtiss thought about all this, the more concerned he became. In his own proposed experiment with *S. mutans*, for example, he saw there was a chance of releasing into nature a new mongrel bacterium capable of colonizing a new ecological niche: the mouth, perhaps, where it could compete with *S. mutans* itself in promoting tooth decay. And even if it could not do that, there was still the possibility that it could, with the help of its new implanted genes, produce streptococcal proteins in *E. coli's* natural habitat, the human gut, and so bring on—as some streptococci do, as side effects—heart and kidney disease.

In other experiments, proposed and, in some cases, instituted elsewhere, Curtiss saw similar dangers, enhanced by *E. coli's* extraordinary sexual promiscuity and its ability to pass its genetic information on to other sorts of bacteria. So rapid and omnidirectional was the gene flow involved, he argued, that it was impossible to predict with any certainty the fate of an escaped recombinant or its altered sequence of DNA. It *might* survive and do harm, perhaps untold harm. It might not. But it was impossible to say with any certainty that it *would* not. Obviously, if recombinant experiments were to go ahead (and he believed, on balance, that they should), then great care would have to be taken with any that did more than merely imitate what might happen in nature. Scientists would have to be very selective about the genes they used and the organisms they took them from. And they would have to take into consideration everything that could be known about the sex habits and plasmids of the strains of *E. coli* they chose.

His graduate students say of Curtiss: "If you don't know all the details of what you want to do, or what you're doing, then forget it. If you don't have the numbers, if you're vague and woolly, he can be very tough." And here again he was concerned with details, information. He was worried that the hot new field of recombinants would attract scientists who simply didn't know enough about genetics, especially *E. coli* genetics, to understand the risks they might take. And this, together with sloppy handling of cultures and spills, might lead to disaster.

His anxiety found a focus in 1974, when Paul Berg and 10 other molecular biologists who had been studying the hazards of recombinants at a special conference at MIT sent a letter to *Science* and *Nature* magazines, calling for caution in some experiments, a moratorium on others, and an international conference in 1975 to discuss the field, its risks and potential benefits. Curtiss immediately drafted an open reply to them, a closely argued 16-page letter which was eventually sent to some 2,000 scientists in the United States and abroad. In it he discussed at length everything he knew about the properties and varieties of plasmids and the pathogenicity and sexual attributes of *E. coli*. Indiscriminate DNA recombination in *E. coli*, he said, might not only cause disease. The genetic information in an escaped batch of *E. coli* might also "directly or indirectly alter the ecological balance between living organisms, the environment in which we live and/or interfere with successful practices in agriculture and medicine to control or treat diseases or disease states of plants and of animals, including humans." For this reason, although he thought recombinant DNA research would prove enormously beneficial and should in the end be pursued, and although he believed that *E. coli* was, on balance, the best available host organism, he recommended that virtually all experiments be banned or deferred. Time should be taken to assess the risks and draw up guidelines.



Dennis Pereria, a member of Curtiss's team, counts *E. coli* colonies growing in culture dishes.

Between the writing of the letter, though, and the holding of the conference that Berg and the others had proposed, Curtiss had a slight change of heart. He still believed that recombinant organisms were potentially very dangerous, and he still insisted on the sort of physical precautions he had put forward in his letter. But he now began to think that another preventive measure might be taken, a measure that would give one more line of defense and at the same time undercut the talk of Andromeda strains and man-made cancers that was beginning to be heard outside scientific journals. Perhaps a special strain of *E. coli* could be constructed specifically for recombinant experiments, one that was incapable of transmitting its DNA or of surviving outside the laboratory. He discussed the idea with a number of scientists in the autumn and winter of 1974. Then, just before the conference was finally held at Asilomar in California in February 1975, he met with four of them, at the invitation of the organizers, to discuss the feasibility of the crippled strain and to draw up a list of recommendations for the physical and biological containment of recombinant organisms. "We were all good friends," Curtiss recalls, "and we microbial geneticists, being an informal, uninhibited lot, did what geneticists do on such occasions. We shouted at each other and shook each other. But in the end we got the job done. Fighting over each line, and making compromises all the way. But we did get it done."

> "I am trying to operate as I've always been trained to, which is to be objective, to listen, to learn, and, if at all possible, to eliminate emotion."

The conference, when it came, was equally stormy. One hundred and fifty leading molecular cell biologists from 15 countries had gathered, some convinced that there was absolutely no harm in recombinant experiments, and others equally convinced that they would give man potentially lethal control over nature. At first, it looked as though there would be no consensus, no compromise. But the mood of the meeting gradually shifted. The change was partly due to the presence of a few reporters, whose questions suggested the growing interest and dismay of the world outside science. It was partly due to the presence of lawyers, who spoke about the responsibility, and even personal liability, of scientists who allowed recombinant organisms to escape. And it was also due, no doubt, to the feeling of many of those present that if the field had to be regulated, then scientists should regulate it themselves and forestall interference. By the last day, the conference was ready to accept, somewhat to the organizers' surprise, a general statement incorporating some of the proposals put forward by Curtiss's group. Certain experiments should be banned. Others should be subjected to a sliding scale of safety requirements, some physical—the kind of laboratory to be used—and some biological—the type of host organism to be used. For this second set of requirements, work should start as soon as possible on a new, crippled strain of *E. coli K12*.

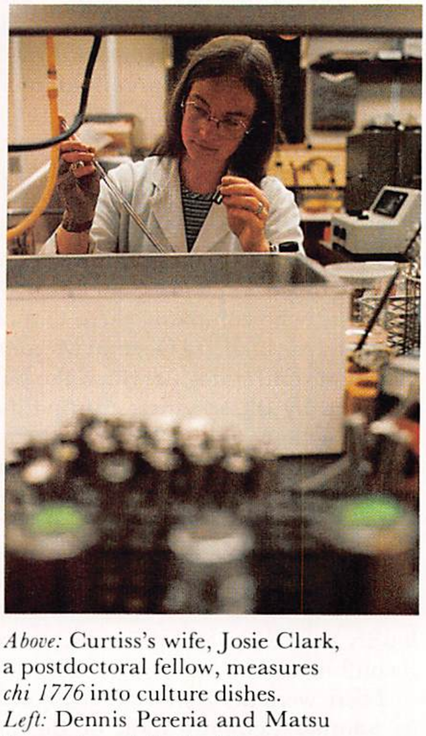
Curtiss was satisfied, and he pushed for interim adoption of these guidelines by the National Institutes of Health. But at the same time he and other scientists suspected that the conference had lulled the participants into a false feeling of complacence about the possible dangers. From some of the talks given, one of them by himself, *E. coli K12* sounded rather a harmless creature, unlikely to revert to a pathogenic state and unlikely to survive outside the laboratory, whatever its DNA insertions. And that, for Curtiss, was not quite the point. The point was that it could still survive long enough to transfer its DNA. If that happened, then a new entity, perhaps several new entities, might be loosed into the biosphere, to affect, if not man, then the chains and balances of other organisms. Something had to be done to better the odds.

Soon after he got back to Birmingham, after a meeting of the NIH Recombinant Advisory Committee, Curtiss called together his research group at the School of Dentistry. He explained carefully to the technicians, graduate students, postdoctoral fellows, and junior professors assembled why he thought it was important to construct a weakened strain of *E. coli K12*, and said that, since they had the knowledge and experience to construct it, they should do so. He explained how he thought they should go about it. They would take four strains from their collection, strains already weakened and made laboratory-addicted by mutations and deletions of genes, and then attempt to cripple them further, making them more useful for recombinant research if possible, but at the same time desexing them and making their survival outside the laboratory absolutely impossible, however altered they were by recombination. He said he thought it would take only a few months to come up with an acceptable strain.

But it took more than a year—a year in which Curtiss had to "subvert" most of the funds he had been granted to do other things. It was a risk that a less senior and less confident scientist would never have taken. But his Birmingham group was also the only group in the world trying to produce a special strain of *E. coli*. The goal was worth almost any consequences.

The strain that Curtiss and his team created in January 1976, after false starts, dead ends, tens of thousands of man- and woman-hours, and what amounted at one point to a battle between them and the organism, is called *chi 1776*, in honor of the Bicentennial. A mutant descendant of one of the four strains they started with, it is unable to grow its own cell wall during replication without the help of chemicals found only in the laboratory. *Chi 1776* is extraordinarily sensitive to ordinary household detergents, sunlight, and the bile salts found in the human gut. It is sexually deficient, both as donor and recipient, resistant to viruses that might pick up and transmit pieces of its genetic information, and incapable, even in death, of transferring its DNA. Altogether it has 15 "locks on the door," some of them mutations, whose capability to revert is about one in one billion, and some of them deletions, unable, like amputations, to return to normal.

"We microbial geneticists, being an informal, uninhibited lot, shouted at each other and shook each other. But in the end we got the job done."



Above: Curtiss's wife, Josie Clark, a postdoctoral fellow, measures *chi 1776* into culture dishes.
Left: Dennis Pereria and Matsu Inoue at work in the laboratory.

It was a remarkable piece of work that other scientists called "brilliant." Never had an organism been called on to carry so many crippling deficiencies. There was a great deal of excitement, worldwide, about the new scientific knowledge it would make possible.* At the same time, the work brought with it an unexpected bonus. For Curtiss had also been learning a great deal about *E. coli K12—chi 1776*'s parent organism—from the experiments themselves, from colleagues like Stan Falkow at the University of Washington, and from everything he could find in the scientific literature. *E. coli K12* was already being used for so-called low-risk experiments. Unlike *chi 1776*, it was not a tailor-made organism, with a deliberately induced constellation of mutations and deletions. It was a laboratory strain, and for all Curtiss's assumptions in his long letter to Berg *et al* that it was possibly dangerous, little that was not ambiguous was known about its behavior outside the culture dish or flask.

Curtiss, then, had decided to pursue the matter of *its* safety too. So when *chi 1776* was finally constructed and was being tested and analyzed in the Birmingham laboratory, he began a series of tests on *E. coli K12*, trying to fill the gaps left by lack of data in the available literature. Later, after a 200-page report on the crippled *chi 1776* had been sent in to the National Institutes of Health, and as the people in Curtiss's group began to take up their own projects again, the tests slowly continued, as they were to do for over a year. Comparisons were made between the typing and behavior of wild strains of *E. coli* and *E. coli K12.* Checks were made of *K12*'s susceptibility to various of the body's natural defense mechanisms. The frequency, in *K12*, of transfer of plasmid DNA to other bacteria was assessed. And at the same time, realizing that he didn't know enough about all the fields involved in infection to be able to come to foolproof judgment, Curtiss called on "experts in gastroenterology, physiology, endocrinology, infectious diseases, etc.," to help him come up with all the infectious pathways a mutant gene might travel.

By now the debate about recombinants had become public. The National Institutes of Health had issued their detailed guidelines, much to the derision of some scientists, who compared them to a report on auto safety issued by the board of General Motors. Meetings had been held in several states, at which the public had been made confused by the scientists' ranting disagreements, recondite language, and shifting mathematical probabilities. And somehow the issue at the center of the debate had shifted. It was no longer the question of risk or safety, the reason why the moratorium had been called in the first place, or a question, in Roy Curtiss's book, of facts and numbers, the tools he had been trained to use. Now, as 1976 progressed, other voices began to be heard more loudly than those asking for answers about the dangers of recombinants.

There were those who spoke about the new technology as another demonstration of the nonaccountability of science, another station of the cross on the long *via dolorosa* leading to human genetic engineering and mind control. There were those who spoke of scientists as barons, spoilers, feuding with each other for grants and fame at the expense of the people and unlikely to respect any restraints put upon them. What had begun as a responsible collective gesture by scientists—the only moratorium of its kind in history—was beginning to turn into a broad-ranging, ignorant, and often acrimonious debate about the responsibility of science for a blighted past and a dim future. Safety, the issue on which Roy Curtiss had spent two years of his scientific life, seemed no longer pertinent.

It came to a head for Curtiss in February 1977, three months after the National Institutes of Health had approved his *chi 1776* for use in animal gene recombination work, and as requests for the strain were still arriving daily in his laboratory from across the world. "I flew into Washington on a Wednesday evening, and the cabbie who drove me from the airport had the radio on. There was a talk show on with this violent opponent of recombinants. He was spewing out misinformation, saying, among other things, that we in Birmingham were creating all kinds of new life forms. I felt like suing him. I would have if I thought it was worthwhile. Then I got to the hotel and WTOP, the CBS affiliate in Washington, had this report

Potential Benefits

The ability of the plasmids of *E. coli* to accept genetic information from other organisms will make it possible to use *E. coli* to create new forms of bacteria that can have immense benefits for man.

- **Antibiotics:** A range of microorganisms could be created to produce a new generation of antibiotics for use in curing gonorrhea, strep throat, and bacterial meningitis.
- **Hemophilia:** The blood-clotting factor that hemophiliacs lack could be supplied by *E. coli* plasmids recombined with DNA that supplies the genetic information for clotting.
- **Insulin:** By combining plasmids of *E. coli* with plasmids containing information for production of insulin, it will be possible to grow human insulin in *E. coli*, instead of relying on the production of insulin in pigs.
- **Viral Control:** Since viruses are selective in the types of cells they attack, and since they often transfer some of their DNA to the cellular DNA, it may be possible to use viruses to make genetic changes in humans or in any developed multicellular organisms. Researchers could begin, for example, with a virus into which has been inserted a fragment of DNA that helps combat a particular disease. The virus could be used to infect the specific cells susceptible to that disease. As a result, the virus would transfer its DNA to those cells and provide them with genetic traits they previously lacked. The goal would be to cure humans afflicted with genetically transmitted diseases, such as sickle-cell anemia and possibly cystic fibrosis.

Roy Curtiss cautions that most of these benefits will require considerable time to develop. Any new drug takes at least seven years of testing before the Food and Drug Administration will permit it to be marketed, and recombinant research hasn't gone far enough to reach the initial testing stage for these "drugs." Curtiss says that the biggest benefit of *E. coli* research is the wealth of new knowledge that will be opened to scientists working in this field. "We're now getting answers to questions we couldn't even ask five years ago. Who knows the questions we'll be asking five years from now?"

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*At the end of May 1977, the first successful implantation of an animal gene into *E. coli* was announced. It was the rat gene for insulin, and it was cloned into *chi 1776.*

VO

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about recombinant DNA where they said they were going to put a tumor virus gene into *E. coli* in a trailer. They showed the trailer, then the newscaster signed off by implying that there was imminent danger of infection. Very emotional. So I went to the National Science Foundation the next day and said, 'What the hell is going on here in D.C.?' And they told me I should have been there on Monday night. First the TV had footage of George Wald [a Nobel laureate for his work on vision and an opponent of recombinant research] saying something to the effect that the technique could lead to the formation of monsters. Then they cut to a Frankenstein movie sequence. And then they had on Ted Kennedy [chairman of the Senate Subcommittee on Health and Scientific Research] saying the discovery of recombinant DNA technology was the most profound discovery since the splitting of the atom. And they cut from there to a mushroom cloud. I could hardly believe it. Such hysterical, irresponsible stuff, all in two days."

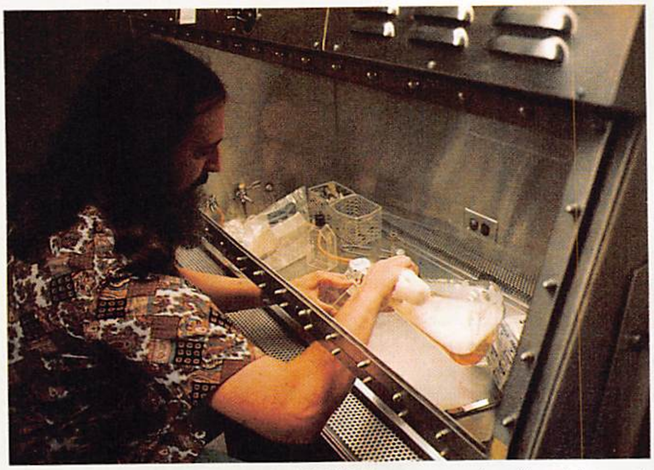
It was about this time that two subcommittees, one from the Senate and one from the House, decided to hold hearings on recombinant DNA, with a view to legislation, and possible licensing and policing.* It was also about this time that Roy Curtiss decided—on the basis of his tests and the data that had been flowing in to him from elsewhere—that *E. coli K12* was probably as completely safe for recombinant experiments as *chi 1776*.

As Curtiss has explained it, "*K12* has a rough outer membrane that makes it unable to colonize the intestine; it has mutations that make it almost impossible for it even to survive in the intestine; and it has nutritional requirements, as most wild strains do not. Furthermore, even under optimal laboratory conditions, it has proved impossible to induce in it by mutation either virulence or the ability to colonize. And since to become a pathogen *K12* would need to display these two qualities, as well as communicability, it could not be made pathogenic by a piece of foreign DNA. As for the transfer of the DNA to other bacteria, it happens virtually never. Even if it did, it would bring with it a selective disadvantage that would remove the bacteria from the population."

It's a fine morning at the Center of Continuing Education at Athens, Georgia, but Roy Curtiss is tired. At last night's session of the conference, he was on his feet at the microphone again and again, arguing about various gene products, correcting the speakers' facts and assumptions, calling for more money for training and research, calling for more accuracy and less misinformation. Later he went out with his fellow scientists to drink and argue; then he stayed up most of the night to write his speech.

Now, tall, dark, gaunt, he stands at a desk on the dais, looking out over the audience, composed mostly of young scientists. Slowly he takes them through a simplified, more personal version of a letter he sent to the legislators and microbiologists two days ago. It is supposed to be about ethics, this speech, but it soon becomes clear that he is going to talk about safety. His point is that if the experiments are completely safe, then they do not involve questions of ethics. He says he is now convinced that the use of *E. coli K12* as a host for recombinant DNA poses no threat whatsoever to humans or other creatures, except perhaps to an excessively careless scientist. He says he does not expect other scientists to be as convinced of this as he is until they have seen the Birmingham group's data and analyses published.

He ends with a plea for legislation based on something other than "political expediency, fear, and ignorance." It is time for society, he says, to be as responsible as the scientists have been. He sits down to much applause. A little later, though, he stands again when a young man in the audience asks him this question: "Historically, scientists have a pretty bad record when it comes to predicting the impact and implications of their research. In the light of that, what are your personal feelings about *your own claims*?" Curtiss pauses a moment, perhaps aware of the buried irony in the question. He is, after all, a chief promoter of containment, and a prime architect of containment, and now he is saying that there is no danger in the experiments. And then he replies in his deep, deliberate voice: "This has been a tough period for me. But I am trying to operate as I've always been trained to, which is to be objective, to listen, to learn, and, if at all possible, to eliminate emotion. I don't know what I would do if I were wrong. But it has weighed on me very heavily. I think I'm right. To me, all the information that we've gathered is just overwhelming in support of no risk and no harm with *E. coli* systems."



Curtiss pours a solution of *chi 1776* into test tubes for shipment to microbiology laboratories around the world.

The morning session ends, and Roy Curtiss, a rough Galilean among the neat sons of scientific Rome, goes off to lunch. He is a man at the frontiers of man's understanding of the processes of life, on a path that will change man's place in nature, for better or worse. Something of a radical, he is accused of being a man without a sense of responsibility. A believer in the common sense of the ordinary man (he was a town councilman at Oak Ridge), he is floundering in a communication gap in which he cannot reach that man. Anxious to spend his time creating even safer strains of *E. coli* to be used in work with human genes, to continue his work toward a better understanding of disease and resistance to disease and toward new types of vaccines for bacteria like *S. mutans*, he is distracted by meetings like this one, where he tries, against mounting odds, to substitute facts for fantasies, what is known for what is feared. ●

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*At two of the Gordon Conferences held in June in New Hampshire, biologists drafted an open letter to Congress that attempted to stop the progress of these bills, which they felt would severely limit genetic research and deprive society of possible improvements in public health, agriculture, industry, and environmental protection.

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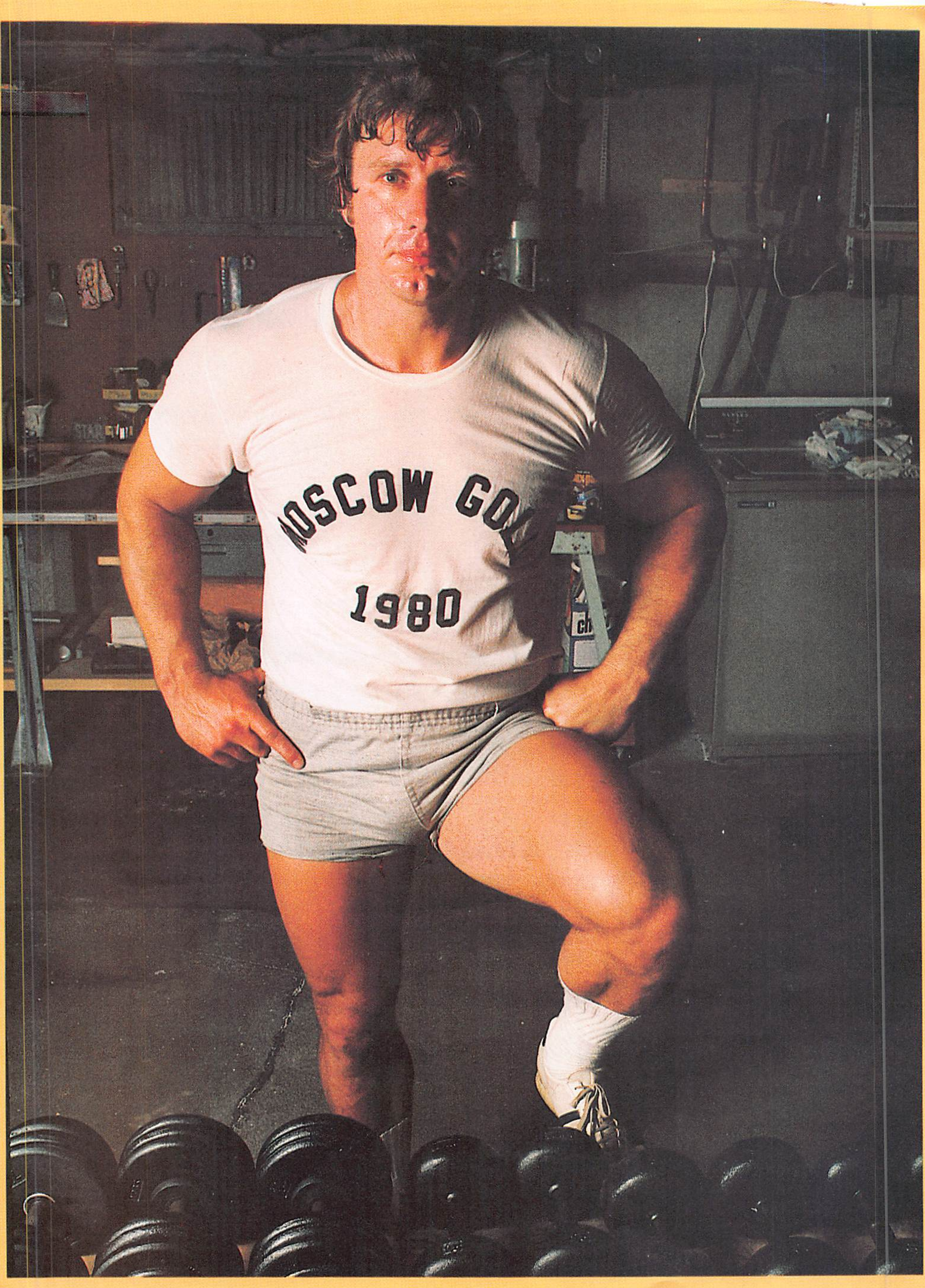
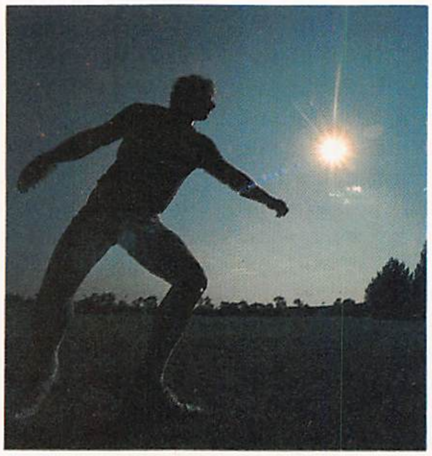

OSCOW GO
1980

THE FINAL MEDAL

An old man with a discus and a dream

MARK GOODMAN



"This is a good day for throwing the discus." Al Oerter stands in bright sunshine on the edge of the green practice field at Long Island's C. W. Post College. He tosses a discus in the air as if it were a Frisbee, and tests the afternoon breeze freshening off Long Island Sound. "You want the wind coming right to left," he explains. "A fellow down at the University of Arkansas once ran tests through a computer, with various angles on the discus, and there are all kinds of charts on the subject. If the wind is at the right angle, it will create a vacuum under the discus and lift it, like an aerofoil." If that sounds like curious talk from the world's most enduring Olympic champion, note that Oerter is also data communications manager at Grumman Data Systems in Bethpage, Long Island. But today, limbering up on the placid college practice field, his six-foot four-inch, 275-pound frame stretching his Adidas T-shirt tightly across his massive chest, Oerter is a pure athlete who knows that computers can carry his precious discus only so far. "You can talk angles and trajectories until you're blue in the face," he says, "and throwers can throw until their arms are hanging down, but until they do it right once, they don't know what it is."

Al Oerter knows. In 1956, as an unknown sophomore from the University of Kansas, Oerter won his first Olympic gold medal at Melbourne, Australia with a toss of 184 feet 11 inches. He won again at Rome in 1960, and again at Tokyo in 1964, and again at Mexico City in 1968. He never entered the Games as the world record holder, or the favorite; he just went out and won an unprecedented four consecutive gold medals. "I never cared that much about records," he says. "It's foolish to go after them. You need absolutely perfect conditions, so you have to constantly seek out those conditions, pick the perfect time and place. One big reason why I was so successful in the Olympics is that after each Games I would pull in my wings for three years and stay away from the heavy grind of competition. When I went back to it I was fresh."

Fresh, but painful. He had to contend with a pinched nerve in his neck that forced him to wear a horse collar at both Tokyo and Mexico City until he stepped into the ring. There was a torn rib cage, a severe inner-thigh muscle pull, a chronic cervical disk injury. But Oerter kept throwing and winning—until after Mexico City. The pain and the pressure of big-time competition finally diverted him from his goal of five Olympic gold medals. After all, he was 32 by then, a nonagenarian by Olympic standards, the married father of two children, a responsible citizen with a responsible job. But he is not at his desk this pleasant afternoon because he has, at the autumnal age of 40, after an eight-year layoff from competition, decided to try for that fifth gold medal in Moscow in 1980. If he succeeds, Al Oerter will be the first athlete in history to win five Olympic gold medals in one event.

It is not an idle dream. Mac Wilkins, the discus champion at Montreal last year and current world record holder, told Walt Bingham of *Sports Illustrated*, "I have only positive feelings about the man and what he's done. At his age he's probing new frontiers of what the human body is capable of doing. It will be interesting to see what happens. I still think, however, that Al is throwing the discus primarily for the enjoyment of throwing, while keeping the door open for competition." That last was a reference to a foot-in-mouth remark Wilkins made to a newspaperman that Oerter was only training to keep fit. That article is pinned to the wall in Oerter's office. As he puts it, with the trace of dry mockery that runs through most of his observations: "Wilkins should remain skeptical. He should continue to keep me back there on a recreational basis all the way to Moscow."

So saying, Oerter steps into the eight-foot circle, turns his back on the grassy field and curls into the discus thrower's classic crouch. Suddenly I am reminded that this pose, washed in bronze, is the very symbol of the ancient Olympic Games: man, poised and concentrating, ready to uncoil and hurl a symmetrical object through the air farther than any man before him. It seems incongruous that Oerter should be performing his magnificent ritual before an audience of only me and a strapping youngster from the C. W. Post track team. Where are the glory that was Rome, the agonies of Tokyo, the rain-soaked drama of Mexico City? But even as I recall his victories, Oerter goes

MARK GOODMAN has written 50 cover stories for Time-Life publications. His book *Fields of Ivy*, about Ivy League football, will be published this fall by Holt.

> "I enjoy the movement of the throw itself. You're working on perfection of motion. It's actually balletic—you can feel your body moving in tune with the training."

into his spin, turning smoothly through the ring, then flinging the discus ("Whoof!") far, far out into center field. It carries 195 feet, or 17½ feet short of his medal-winning toss at Mexico City. And the ante has since been upped: Wilkins's current mark is 232 feet 6 inches.

Discus practice has its Newtonian drawbacks: if you hurl an object 195 feet, then sooner or later you have to trot out 195 feet to retrieve it. Oerter doesn't mind; it's all part of training. He returns, and we sit down in the football stands next to the practice field, where Oerter leans back and begins to discuss the event that has occupied so much of his life for 25 years, that will send him in search of Olympic gold at the age of 43. "This is a very precise event," he says. "I equate it with a dance—you're working on body movement, perfection of motion. I enjoy the movement of the throw itself. It's actually balletic—you can feel your body moving in tune with the training. I threw the shot when I was in college, but I didn't like it. Shot putting's a Neanderthal event."

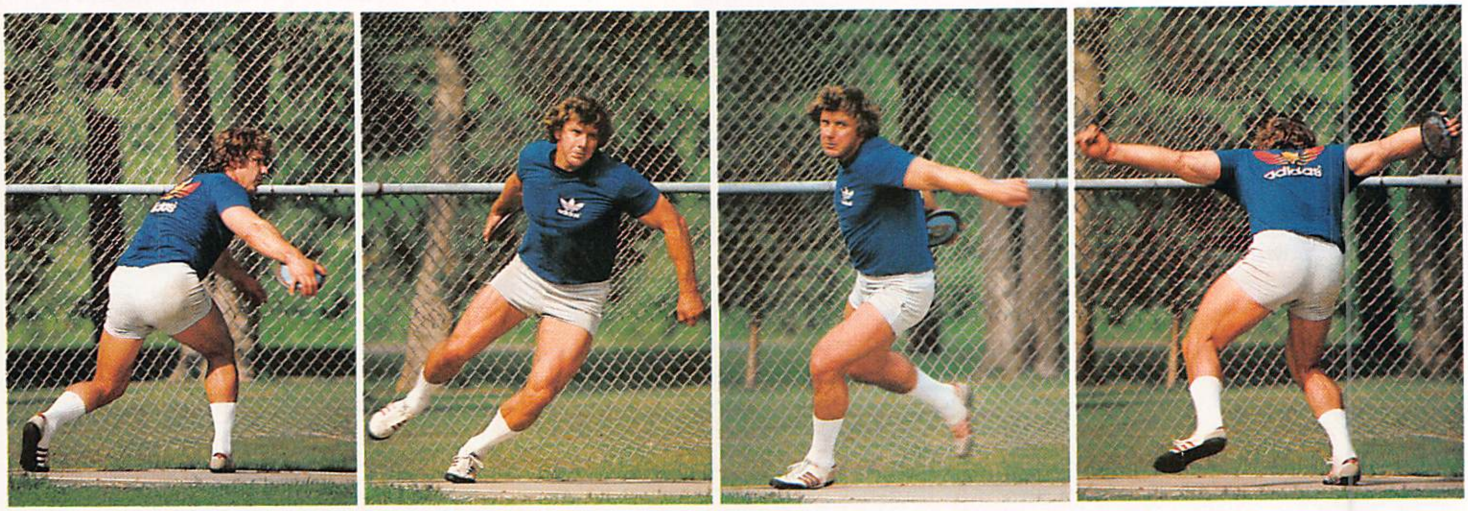
Not the discus: it is a tense, compact craft that imposes strict demands on its practitioner. Oerter is just about the perfect size. He would prefer to be a good inch taller, but if you are too tall, other problems arise. Oerter once cited the example of his classmate at Kansas, Wilt Chamberlain, to make his point. "If they ever expanded the discus throwing circle to nine or 10 feet," he said, "the records would really soar. Then the larger, heavier athletes could compete. As it is, you can be too tall. Wilt actually got dizzy in the ring. He's a big, strong man, but he's seven feet tall, and to try to turn around in an eight-foot circle—it was like a top spinning. There was no lateral movement or forward movement; he was just spinning helplessly in place."

Oerter has the size, speed, and reflexes of a really good pro football lineman—Mean Joe Green or Wally Chambers, say—and a pitching arm that might have rivaled Nolan Ryan's. Weight and muscle are needed to project the discus; long arms are required to provide the leverage for trajectory; balance is a must if a thrower is to whirl in a tight circle without pratfalling like a Disney elephant. "If you don't have the natural coordination," Oerter says, "you better go on to something else. If, on a turn, I don't hit all the proper angles and get the proper trajectory on my throw, then I just don't get the distance I'm trying to achieve. But I also have to be aggressive. I can't turn slowly and look pretty and expect to get any distance.

"But in spinning, a lot of things can go wrong. If you don't have to think about them to correct them, if your natural reflexes act, you're a lot better off." True, because in the discus the moment of pushoff is also the point of no return. A man Oerter's size, spinning 630 degrees in barely a second, creates a wild *whoosh* of torque, and the slightest mistake can prove calamitous. "I almost killed the world champion that way," he recalled. "Fortune Gordien was standing right beside me, inside the cage. I thought I had thrown it the right way, but it bounced off the net behind his head. He kind of turned white."

The disk must be released at the precise moment with the maximum spin at the optimum angle off the forefinger—with a credible adjustment for wind direction and velocity. When you consider all these calculations, you begin to understand that Oerter's balletic analogy is not entirely fanciful. "You must hit a dynamic balance," he continues. "You do it from a one-and-three-quarters turn, and the release of the discus spins it clockwise from your right hand. It's a matter of maximum spinning efficiency—a maximum effect with a minimum of strain. The more you strain, the less distance. It has to be a very relaxed type of motion.

"So you can understand that it takes years to perfect the technique—five years at least. Discus is a sport where age is no barrier, although there is often a mental barrier. It's not so unusual to be throwing at 40. I imagine that in the



Al Oerter practices at C. W. Post College on Long Island.

discus there are more older athletes around than in any other field event."

Oerter has a point. Most Olympians are grizzled veterans (and swimmers are washed up) at 22. Yet Gordien was competing at the world class level at 37, and so was Jay Silvester at 38. Still, none of Oerter's predecessors has dreamed of stepping into an Olympic ring at 43. So why risk it? The sad lessons of Johnny Unitas and Willie Mays are there for all to see, and Oerter is no fool.

He gazes across the football field. "I hadn't picked up a discus in eight years," he muses. "The wood was flaking away in the old ones I had stashed away and I had to order some new ones. I didn't see any glory in it, or any of that nonsense. I've had all that. People keep asking me why, if I wanted to go after a fifth gold medal, I didn't do it at Munich or last year at Montreal. I'll tell you. After Mexico City I felt pressure and I simply didn't have any interest. The same attitude carried over the period leading to the last Games. To go out and win the thing every time—that isn't much fun. Where's the challenge?"

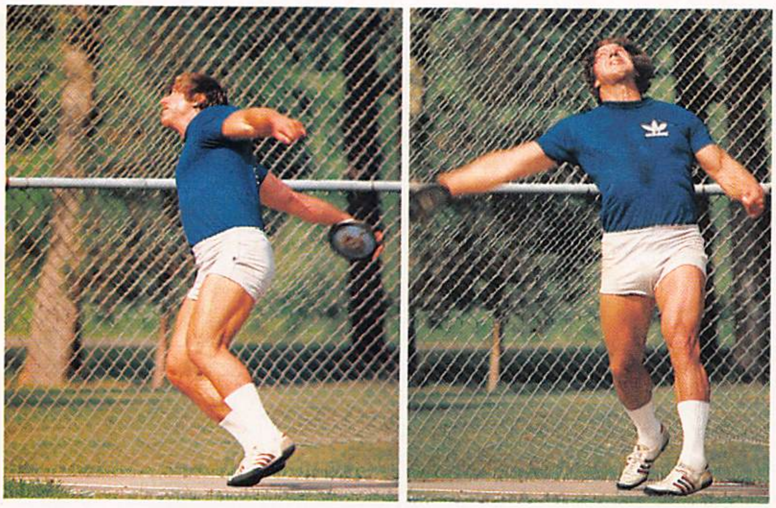
He pauses again. "I have to feel an urge, a spark of interest. That spark has come back in the last year. There is something about the Olympics that gets in one's blood. The assembling of all those people of various nationalities, all with the same purpose; the training; the competition; the pressure. There is an idealism that makes it seem like another world. I know it sounds dumb, maybe it *is* dumb, but I can get really charged up in the Olympics."

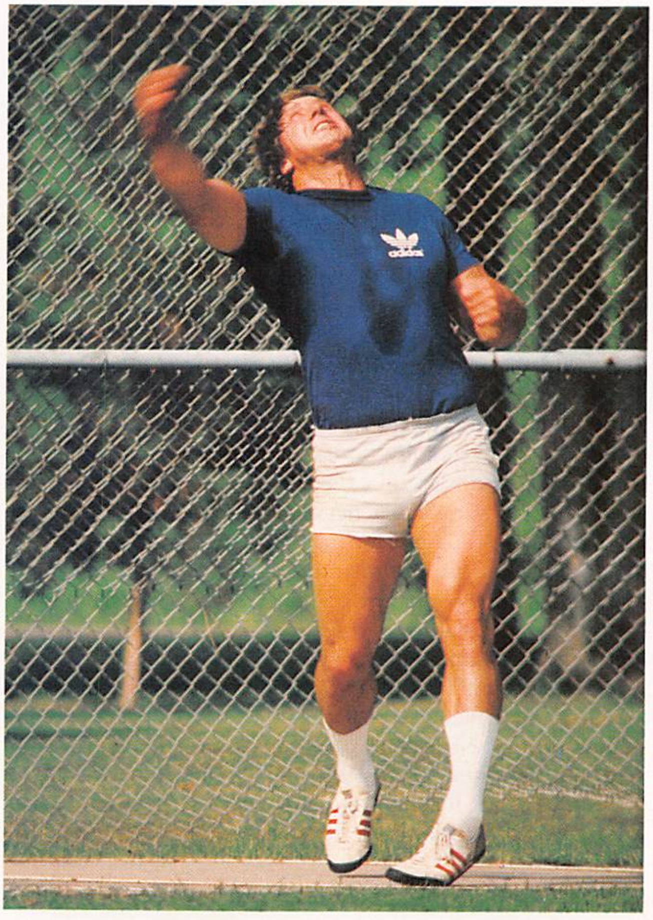
Oerter looks like a perfectly sculpted piece of Malibu musculature, yet he is city-bred, intelligent, and sensitive to persisting notions that athletes of his size are grotesques who carry dead squirrels in their pockets to pet. He is a dedicated amateur who likes meeting the Russians and East Europeans on his own hook, but who firmly believes that "an athlete is an athlete, whether he gets paid or not," and that an open Olympics (in which both professionals and amateurs compete) is the only answer to the madness of today's "shamateurism." He loves children (although divorced, he retains custody of his daughters, Chrystiana, 18, and Gabrielle, 15) and likes to help the young throwers who work out with him at Post, but he has never had a personal coach, and is certain he doesn't have the patience for coaching. He is shy, but city-wise and a bit of a showman. He's forthright off the field—and a psych artist when he's competing. "I suppose you can see all kinds of conflicts," says Oerter. "I'm a complete introvert, but an extravert when it comes to athletics."

It was bred into him. He was born Alfred Oerter Jr. in Astoria, Queens, New York of German-Czech descent. His father, a husky, gregarious former athlete (nine letters in high school), was a successful plumbing contractor who was able to move the family out of the hot streets of Queens into the tree-shaded pleasantness of New Hyde Park, Long Island. The older Oerter was fond of telling a story about his son on the practice field at Sewanhaka High School. Then a sprinter, young Al was clipped in the ankle by an errant discus one day, and when he picked it up and casually flipped it back far over the hurler's head, Coach Jim Fraley quickly escorted him to the discus ring. It was obvious that an athlete of Oerter's burgeoning proportions, who had the hand-eye coordination for baseball and could turn the 100-yard dash in 10.2 seconds, had a future.

Oerter's mother died of cancer when he was a senior. "I wanted to get as far away from home as possible," he recalls. He seriously considered passing up college for the army, but Coach Fraley got him a scholarship to Kansas and encouraged him to take it. He did. In his second year he made the Olympic squad and, though he weighed only 235 pounds, Oerter gave the world its first wondrous look at what Jay Silvester later described as "that freight train of an arm" as he snatched the gold medal from the world's most experienced throwers, among them his fabled teammate, Fortune Gordien.

He quickly became a fixture on the international track





PHOTOGRAPHS BY KEN REGAN/CAMERA 5

A man Oerter's size, spinning 630 degrees in barely a second, creates a wild *whoosh* of torque, and the slightest mistake can prove calamitous.

circuit. He also showed his toughness by being one of the first prominent athletes to stand up to the haughty, hidebound Amateur Athletic Union. In 1958 the AAU invited him to go on a four-week East European tour, with the stipulation that Oerter compete only against the Russians and then return home. That was fine with Oerter. By then he had married his high school sweetheart, Corinne Benedetto, and she was pregnant. "After we beat the Russians," he recalled, "I was told I had to finish the tour. I appealed to the AAU secretary, but he told me that anyone leaving earlier would have to provide his own transportation." Even though he was broke, Oerter refused to continue on to Athens with the U.S. squad. He stayed in Moscow until a Russian athletic official paid his hotel bill and bought him a ticket home.

"There is an idealism about the Olympics that makes it seem like another world. I know it sounds dumb, maybe it is dumb, but I can get really charged up in the Olympics."

By 1960, Oerter was a father and a Grumman employee who had recently survived a nasty automobile accident (he still carries a long scar under his chin). So when the U.S. team went to Rome in 1960, the favorite to take the discus was not Oerter but Rink Babka. That, too, was fine with Oerter. "I enjoyed being overlooked," he says. "Most of the other guys were tense. I never let myself get into pressure. I followed a set pattern. I tried not to look at my competitors when they were throwing. I either limbered up away from the ring, or did something that kept me thinking about my own throw. And I never tried to win on my first throw. I just tried to throw well enough to establish a position. Then I would relax and work on my technique. I left the mental battle to the other guys."

The other guys lost that battle in Rome when Oerter topped Babka and the powerful Russians with his fifth toss, of 194 feet 2 inches. Two years later, at an AAU meet in Los Angeles, Oerter broke the world record with a throw of 200 feet 5½ inches. He thus became the first man to throw the discus over 200 feet, a barrier once considered as impassable as the four-minute mile.

Still, it was the 1964 Olympiad that elevated Oerter to the realm of mythology. This time the favorite was Ludvik Danek of Czechoslovakia. Oerter had been counted out; in 1962 he had pinched a nerve in his neck that left him unable to move his left side properly during a throw. Three doctors had advised him to quit, but Oerter had one of them help him construct a sort of Rube Goldberg horse collar of foam plastic, and he continued to train. Six days before the competition, he tore some cartilage away from his ribs. Instead of dropping out, as doctors insisted he do, Oerter taped his chest as tightly as a bat handle, took a heavy dose of Novocain, packed himself in ice, and went out and executed his first throw as poorly as expected. It didn't take long for the Novocain to wear off; Oerter was in such pain that he couldn't lie down after his first toss. That may have been all to the good, because on his second throw, with thousands of Japanese on their feet cheering him, Oerter flung the discus into the air with all he had left, and the third throw be damned. He fell to his knees, blind with pain. When the haze cleared, he discovered he had reached 200 feet 1½ inches—a new Olympic record. He drank his share of the Czech beer Danek had brought for his own victory celebration, and before he mounted the podium to hear the *Star-Spangled Banner* played in his honor for the third time in 12 years, Oerter finally let go. "I gutted it!" he shouted. "I just gutted it!"

After that he was "The Man"—like Nicklaus on the fairway, like Connors on the court, Oerter was the one you had to beat in that eight-foot ring. Once again, though, he took it easy in 1967, once again he came into the Olympics the underdog (teammate Jay Silvester, the mammoth Utah insurance salesman, was favored)—and once again he injured himself working in a wet ring in Mexico City. "I'm just not a good mudder," he says. He had pulled the abductor muscle high on the inside of his upper right thigh. "It's the worst thing that can happen to a discus thrower. I couldn't make an involuntary left turn."

He was also plagued by the same pinched nerve, but steadfastly refused to wear his collar. It kept him from rocking his head all the way back, which in turn lowered the trajectory of his throw; it takes very little to throw the discus off course. So: back to the ice packs and Novocain.

Mexico City was also a meteorological nightmare for athletes. The altitude sucked the air from their lungs, the weather seemed to change hourly. On the morning of the discus competition, the sun shone brightly; by early afternoon, it had given way to a wind-driven rain.

Oerter carefully ignored his opponents as they fidgeted through a half-hour postponement. The competition finally got under way at 3:30. Oerter's first throw left him in third place. On his second throw his leg forced him into a foul. When he stepped into the ring for his third throw, the stadium fell silent for perhaps the first time. Shutting out the pain, Oerter hurled himself into a prodigious spin and fired the discus 212 feet 6½ inches—a full five feet farther than he had ever thrown in his life. That took all the oomph out of his rivals, and by the time twilight had settled over Mexico City, Al Oerter had stepped to the podium to receive his fourth gold medal.

Later, Oerter reflected with wonder on the singular intensity that seizes the quadrennial Games. "I enjoyed the competition because it was funny and tragic. It was funny the way guys got themselves ready—the stories of who was doing what in practice, the bravado, the psyching, the beads of sweat that broke out in Mexico City when stories circulated that they would check us for drugs. It was funny

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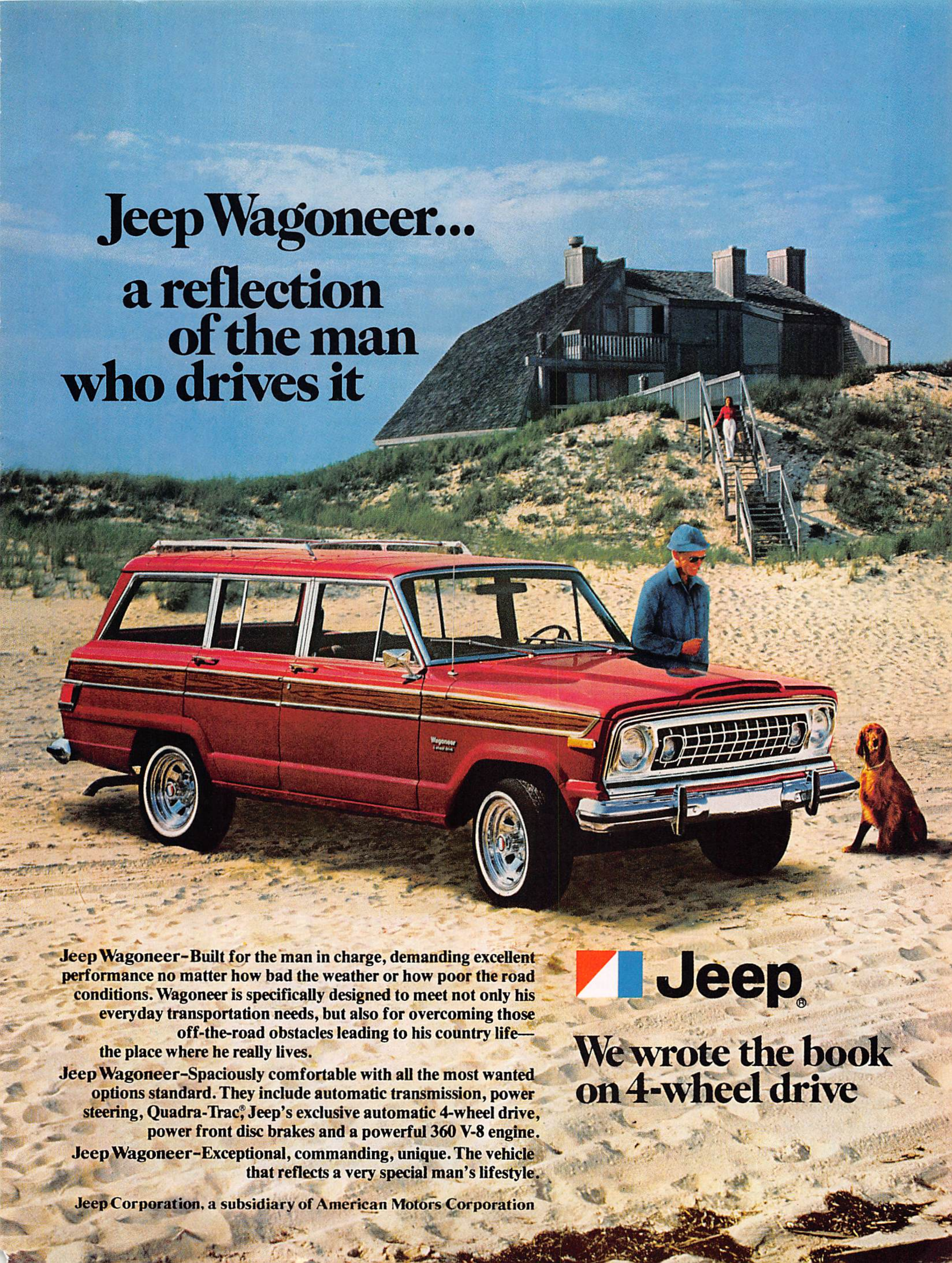

Jeep Wagoneer–Built for the man in charge, demanding excellent performance no matter how bad the weather or how poor the road conditions. Wagoneer is specifically designed to meet not only his everyday transportation needs, but also for overcoming those off-the-road obstacles leading to his country life—the place where he really lives.

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We wrote the book on 4-wheel drive

the way architects spent years planning the facilities, and the first thing the athletes did was hang their laundry all over. It was tragic the way someone like Jim Ryun could be so totally committed that it would be traumatic. The mental anguish can be devastating."

After Mexico City, Oerter felt some of that anguish himself. Answering reporters about a fifth gold medal, he said, "I don't think you guys realize what you're asking me to do. You can't imagine the work that goes into it—the sacrifices. I don't see how I could ever do that again."

Yet here he is now, on the playing fields of C. W. Post, going through *that* again. It seems that in 1975 he cooperated with Bud Greenspan on his estimable TV series *The Olympiad.* Part of the series traced the triumphs of "The Incredible Five"—distance runners Emil Zatopec and Paavo Nurmi, sprinter-hurdler Fanny Blankers-Koen, gymnast Vera Caslavska, and Oerter. One evening Oerter told Greenspan he was very taken with the project.

"Well, we're very taken by what you're doing for us," Greenspan said.

Oerter replied that the old films had rekindled an old dream. "Maybe I'll try to do what I said I'd do in Melbourne in 1956. I want to try for a fifth gold medal."

So a friend had a T-shirt made for him with MOSCOW GOLD emblazoned on the chest, and the long, long grind began all over again—with a few signal changes. "I started training again in May of 1976," he says. "The first thing I did was change my diet. I used to eat a huge steak and pounds of potatoes at a sitting. Age and inclination have made me unable to handle that now. I make my own yogurt, I eat bran, meal bread, and a concoction of raw eggs, honey, and raw protein. I'm eating half the amount of food I was eating in 1968, but I'm putting on as much body weight as I was then, and it's useful weight, not sloppy. I used to have this mental thing that I had to eat steak to put on good body weight, but I was wrong.

"For strength, I divide my body into two parts. I lift weights for upper body strength on Mondays and Thursdays, and for lower body strength on Tuesdays and Fridays. Then I throw three days a week. I try to overlap one of those days with lifting so I can have one full day of rest—my body needs that."

He lifts at a local gym and at the home of a friend and former Mr. World, John Boos. The training is progressing at a solid pace. Last year he was bench pressing 225 pounds, lifting another 225 pounds, and curling 100 pounds. His chest measured 46 inches. One year later he is bench pressing 475 pounds, lifting 475 pounds in the deep knee squats, curling 250 pounds, and his chest measures 52 inches. He has put on 40 pounds.

"I'm not sure exactly what weight I'm trying to reach," he says, "but I'll know when I get there. When I can't turn properly, or when an arm or leg is getting too heavy and I'm losing flexibility, then I'll start to take some excess pounds off. I guess 290 will be about right.

"Another thing, I've always been an arm thrower. I never relied much on turn and torque. I'd just flop around in the ring and WHAMM!—my arm would pull me through. But that won't get me out to the 235 feet or so they're going to be throwing. So I've had to change, develop more technique. I'm hitting about 200 to 205 feet now, and I'll improve on that gradually. What I'm basically trying to do is regain the strength I had in 1968, then add 25 percent to it. If I can add technique to improved strength, maybe I can compensate for age and that certain lethargy that comes with it. But I'll tell you, I feel like I did in 1956—I don't think anything has changed."

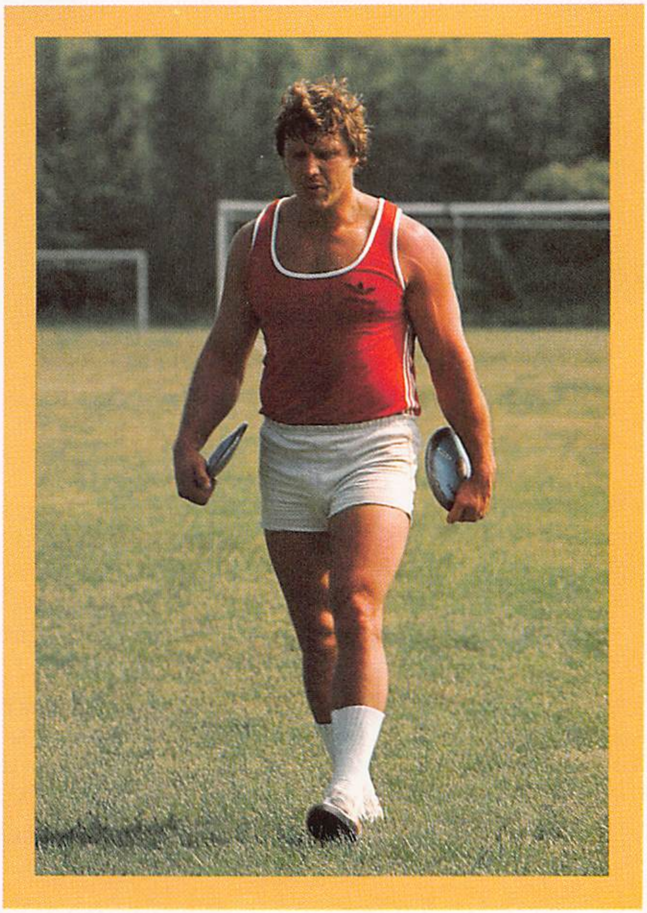
If you hurl an object 195 feet, then sooner or later you have to trot out 195 feet to retrieve it.

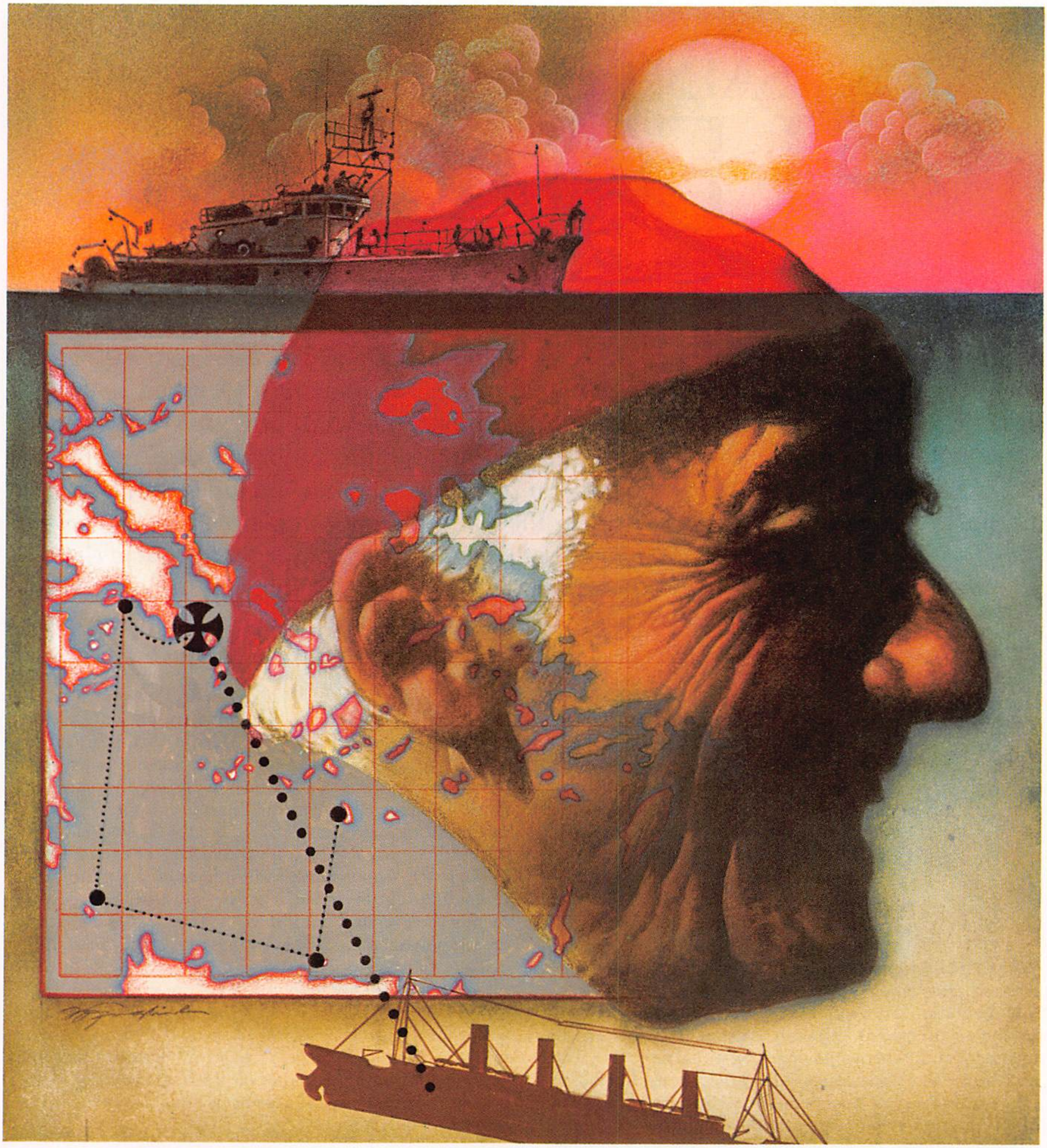
It's characteristic of Oerter to brush aside petty considerations like the passage of 21 years. He already has won several tough local competitions, and he knows, with the security of a champion, that slow and steady progress may well lead to ultimate victory. And if it doesn't? Oerter ponders the question as we walk back over to the field.

"Truthfully, I don't know if I can win or not. I'm just enjoying this on a day-to-day basis. I'm not projecting to 1980 and saying, 'Hey, I'd better get going or I'm *not going to win.*' Who needs that? I just enjoy being in condition again, being strong and applying the strength in a graceful manner. I guess it's part of the maturing process, but if I don't win, I'll still have had a great time."

As we reach the ring, he stops, selects a discus from his bag, then says, "I don't know why, but something special always happens to me in the Olympics. Maybe it will happen one more time."

With that, Al Oerter steps into the ring, goes into his crouch, then spins and ("Whoof!") hurls the discus on a tight, inclined plane over the broad reach of green. The wind suddenly lifts it, like an aerofoil, and the disk swiftly disappears into the dazzling afternoon sunlight. ●





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The production of "The Cousteau Odyssey" specials for PBS is made possible by a grant from Atlantic Richfield Company to KCET, Los Angeles, expressly for the funding of the broadcasts. The specials are produced by Captain Cousteau and Philippe Cousteau in association with KCET.

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SAINT COLUMBA'S LEGACY

The Irishness of Irish art

ALEXANDER ELIOT

Up to now the only way to get a sense of medieval Ireland has been to visit the old country's libraries, museums, and remaining ruins. Beginning in October, however, Ireland's chief relics will be on display at Manhattan's Metropolitan Museum, and later in Boston, Philadelphia, Pittsburgh, and San Francisco. Along with 70 metal and precious-stone art works of incalculable importance, the show includes fabulous and fragile illuminated manuscripts. Among them: the *Book of Dimma*, the *Book of Armagh*, the *Book of Durrow*, and one of the four Gospel volumes that comprise the *Book of Kells* in its modern rebinding. Tradition ascribes more than one of these codices to "Himself"—Saint Columba, the patron saint of Irish art and letters. What's so remarkable about these books? Let's examine a single vellum leaf from one of them.

As medieval codices go, the *Book of Durrow* is modest in size, with pages measuring a mere 9½ by 6½ inches. I have selected a page of pure ornamentation called folio 192 verso (*see opposite page*), which seems to me both very beautiful and intensely Irish. Bright-yellow orpiment, glowing lead red, deep-green acetate of copper, a warm black, and the ivory tone of the vellum itself were the artist's main means of expression. What a modern critic might call a vivid "color statement" resulted, and this achieves immediate impact. Yet the ornamentation is not quite so abstract as it seemed at first. In the rectangles at top and bottom, serpents writhe together; and, whether lovingly or in earnest, they bite each other. The serpents appear captive, moreover, loosely tangled in a net of knots like letters running wild. The same curious net reappears in the two flanking rectangles, wherein wolflike creatures bite each other's haunches. What does all this signify? One's thoughts begin wandering with one's glance, baffled and yet aware. This is just the state of mind, I submit, that the artist was aiming to induce. The medallion in the middle of the composition, one now perceives, radiates yellow light from a whirling tangle of colors and snowflakelike figures. At their center appears a tiny Cross—perfectly still.

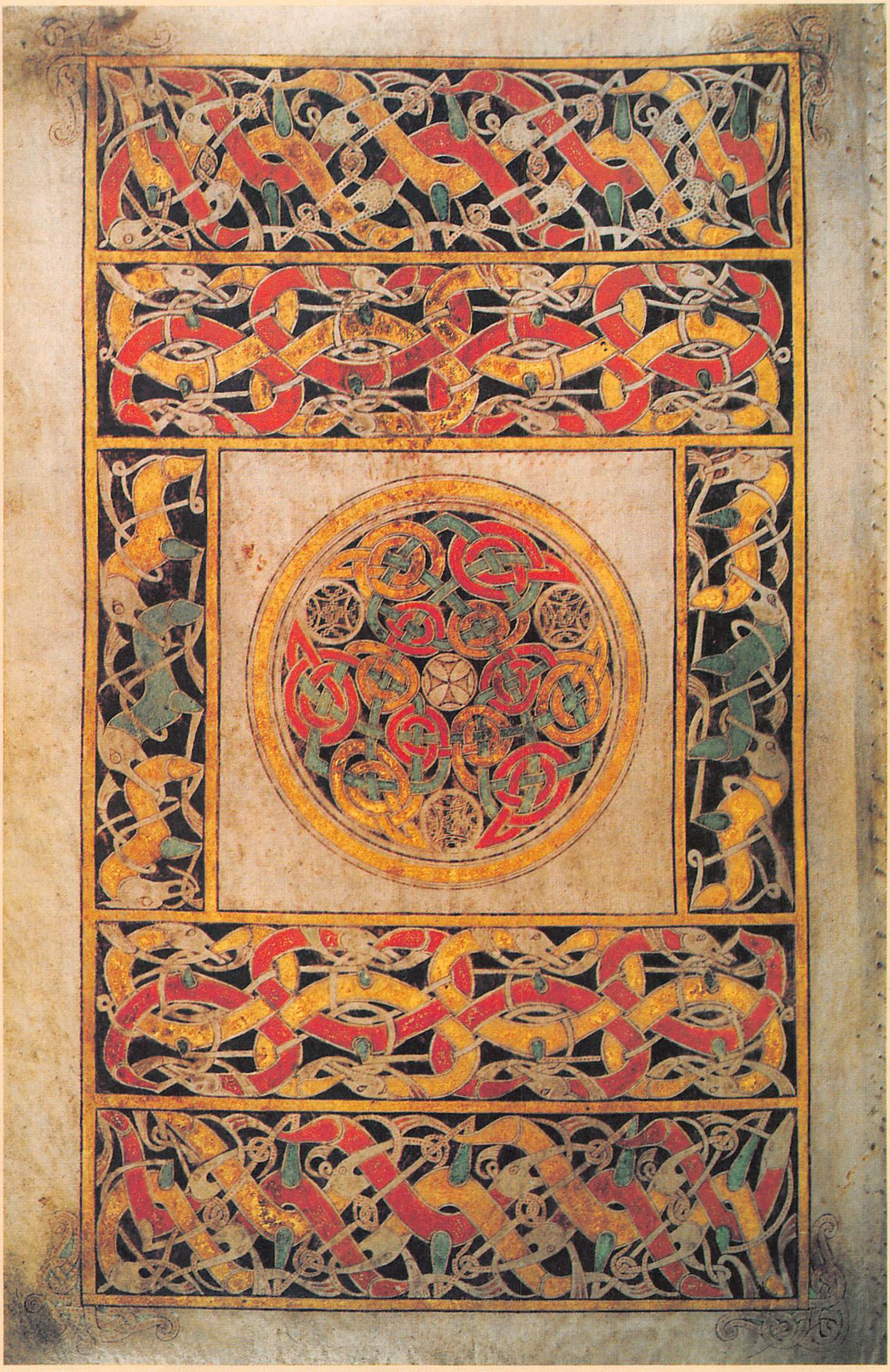
What a contrast this is to classical aesthetics, which always called for subordination of the parts to the whole. Pull out a coin—a dime, say—and notice how the details are clear and few. Nonrepresentational elements such as lettering stand aside from the main image, which plainly dominates the entire circle. Irish art, however, is the opposite of classical. If one could comb out all the involutions of design to be found in Irish codices, they'd stretch for miles. In these volumes, compression is achieved not by paring away details, but by packing in more and more. This conveys a sense of inhuman energies regressing to infinity, like fine watch springs, or DNA molecules. Here the aesthetic whole—be it a vellum page or even a single initial letter—soon vanishes in contemplation of the parts. It is as if the "little people," the fairies of Irish legend, were casting their spells. Comprehension blurs out as one peers; dreaminess intervenes. These things make one's head spin.

Take the page in question again. Once I've allowed myself to be visually involved, it becomes just as much a tangle of velocities as of colors *per se*. I find myself thinking about the magnetic fields stirred up in cyclotrons, and the millisecond-short lives of particles in flight. Subatomic experiments, however, center on the seeming abyss of the nucleus, whereas the half-abstract representation before us centers on the Cross.

One day in 1868, a Limerick boy went digging for potatoes in the ruins of an old fortified farm called Ardagh. The point of his spade struck something smoother and harder than any spud; the object had a silvery gleam. Falling to his knees, the boy brushed the dirt from the only ancient (*circa* early eighth century) Irish chalice ever found. It is a wide beaten-silver communion cup, ornamented with woven and beaded gold filigree as sinuous as weeds in a rock pool, and inset with fat bronze-veined studs of red and azure glass. To drink from the heavy chalice in Holy Communion, one would have to heave it up in both hands and tilt it toward one's lips. At that moment, but not until then, a rock crystal previously concealed in the hemispheric hollow base of the chalice

ALEXANDER ELIOT, former art editor of *Time* magazine and author of many books on art, is a Contributing Editor of *Quest/77*.

PHOTOGRAPHS COURTESY OF THE METROPOLITAN MUSEUM OF ART



PHOTOGRAPH BY GREEN STUDIOS, DUBLIN

Book of Durrow's *folio 192 verso is a full-page hand painting that precedes Gospel According to Saint John.*

would suddenly shine forth to one's fellow communicants like some immense teardrop or the sun through the silver clouds of Ireland. This object too is in the coming show, and it's the only other item I need mention.

My theme, the Irishness of Irish art, is a twisty matter. Art criticism cannot get much of a grip on it; perhaps storytelling can. Glancing back at the *Ardagh Chalice* and that page from the *Book of Durrow*, what single quality apart from playful involution and magically masterful handling do they share? Isn't it an element of mystery? The concealed crystal in the one, the minuscule Cross in the other—what does their still inwardness convey?

I'll start with an anecdote from the *Confessions* of Saint Patrick, the man who brought Christianity to Ireland (and baptized Columba's grandfather). It seems that when Patrick first reached Ireland from his native Wales, certain Druids befriended him. All they asked in return was that he partake in their kind of communion feast, consuming a drop of sacred honey at a ritual in honor of the sun. But Patrick piously compressed his lips; he would not eat. And that night, he relates: "Satan assailed me violently, a thing I shall remember as long as I shall be in this body. And he fell upon me like a huge rock, and I could not stir a limb. But whence came it into my mind, ignorant as I am, to call upon *Helios?* And meanwhile I saw the sun rise in the sky, and while I was shouting *Helios! Helios!* with all my might, suddenly the splendor of that sun fell on me, and immediately freed me from all misery."

What had happened to him? We know that the Druids used to subject their own novitiates to an excruciating test. They would lay heavy stones across the chests of priest candidates, while calling upon each one to compose rhymed replies, *extempore,* to overwhelming questions. Perhaps they cast a spell upon Patrick (hypnosis, we'd call it) in order to subject him to a similar ordeal against his will. Latin was familiar to him, but he possessed little or no Greek. *Sol*, the Latin for sun, was the word he would have been expected to shout. Instead he hit upon the Greek equivalent, *Helios*, which seemed to do the trick. But why?

Columba refused to surrender his transcript because "the Word of God belongs to all." Hence arose the earliest recorded instance of a wrangle over copyright.

There is, I suggest, a reasonable explanation. Familiar words used for familiar things tend to obscure the actualities. They act as labels applied automatically: recognize, name, ignore. So if Patrick had greeted the sun with *"Sol,"* the word which normally sprang to his mind, that could well have dulled the vividness of the event for him. But in his astonishment at the glory of the sun coming up, he cried out a relatively unfamiliar word: *"Helios!"* It acted not as a label but as a saving prayer.

Sudden illumination and release such as Saint Patrick experienced is celebrated, I maintain, in Irish art. That Cross at the center of the sunlike medallion shown in the *Book of Durrow* and the crystal hidden in the base of the *Ardagh Chalice* are by no means incidental. They hint at the miraculous. Each of these masterpieces employs bemusement and surprise in such a manner as to give a momentary glimpse into divine law, the flower of life.

Patrick's own final victory over the Druids was like that too. One day at Tara, the High King's court, he put them peacefully to rout. "Right now in the presence of our King," the Druid priests had boldly demanded of him, "explain how your God can be One and simultaneously Three! Explain the paradox of your Holy Trinity!" Patrick passed that supreme test in a moment. Maintaining a noble silence, he stooped to pluck a common shamrock—a three-leaved clover—from the grass. The very ground of Ireland had spoken for him. From then on, Patrick went from strength to strength. He was able to bequeath a scholarly and well-settled church to his adopted country. In the next generation, the numerous clergy spoke in Latin while the equally numerous bards sang in Gaelic. The peasantry and the crimson-mantled nobles alike were ardently Christian. Cowherds' pipes and churchbells mingled with the shimmering sound of harps upon the air, crossed only occasionally by the clattering of polished swords. A glossary compiled by Cormac, the Prince-Bishop of Cashel, gives sparkling evidence of how things were. Consider for instance this definition of a Gaelic colloquialism: *"Ana:* these were the little cups set by wells under strict law. Hence the saying, 'He suffers cups by waters.' And often they were of silver. . . . That weary travelers might drink from them they set these vessels by the wells, and kings put them there to test observance of their law."

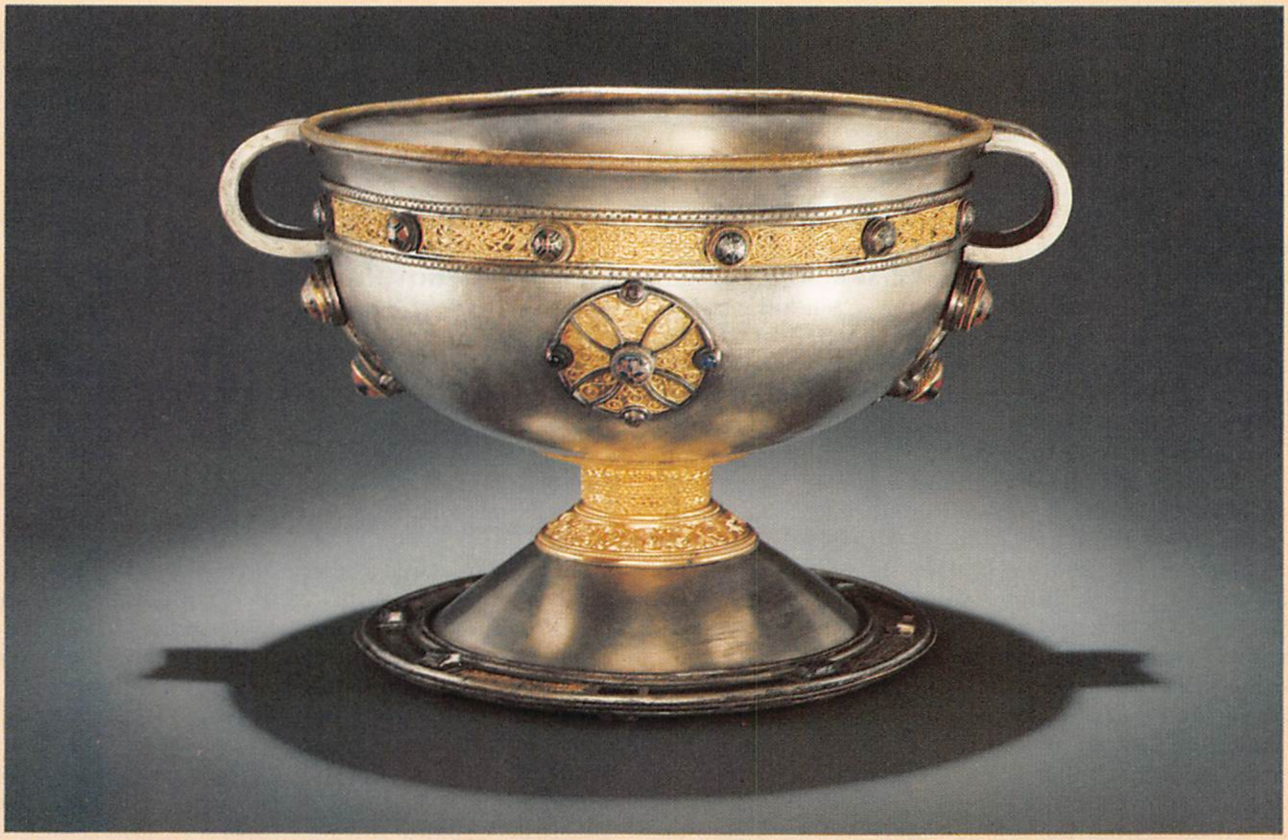
Such was the world into which Columba of the Quick Hand was born in the year 521. He was raised on alphabet cakes; hence his lifelong appetite for letters. His father was a king in Donegal, but Columba preferred church service to hereditary rule. He was ordained in young manhood. And thereafter, according to his seventh-century biographer, "Not an hour of Columba's life went by without some part spent in prayer, or study, or transcribing the word of God."

Following the custom for young clerics of the time, Columba peregrinated throughout Ireland acquainting himself with religious leaders and their libraries. But when he reached the dwelling place of Longarad Whitefoot, he got a shock. The story runs in part as follows: "Lon was a master in theology, history, law, and poetry. Columba came to be his guest, and Lon hid his books from him. So Columba left a curse on the books. 'May that which you have begrudged me be useless after you!' he said. And so it was, for the books are still amongst us yet no man can read them." Might the books of that intriguing tale have been written in ogham script, by any chance, or in some cryptograph devised by Longarad himself? On this point, legend is silent.

The whisper went around that Columba cast spells when crossed. Many a mild cleric feared the itinerant's temper, and became his enemy. Meanwhile he wandered, praising God and nature everywhere. Derry was famous for its sacred groves of Druid oaks, and Columba confessed to fearing "death itself less than the sound of an ax in Derry of the West." On Aran Island, he wrote: "The garden of God is within sound of the bells, so angels come to every church service." That might appear piously fanciful, but in fact the observation echoed Druidic lore concerning a blessed island west of Aran. At Durrow, where he served as a monk for a time, Columba noted: "The wind plays through the branches of the elms as if through the strings of red-gold harps." Passionate and unpredictable, he tramped Ireland's briny shores with his head in her swan-pierced clouds; or else he stopped in dank monastery cells, with that same proud head buried in books. His apprenticeship for sainthood was long and carefree. At 40, however, he found trouble.

He was visiting Saint Finnian, Abbot of Moville. Columba had been ordained at Moville's famous school of divinity, and Finnian thought the world of him. So the good old man lent his most precious possession to Columba. It was the only copy in all Ireland of Saint Jerome's translation of the Gospels into Latin. Finnian had returned from an arduous pilgrimage to Rome bearing this unique manuscript. Columba studied it with keen delight. Then, unbeknownst to Finnian, he began copying out the text. This labor of love was quickly done; it took 12 days. At the end of the final day, apparently, one of Finnian's monks stooped to spy through a keyhole on Columba's secret copying. Columba had a pet crane with him. This curious custom seems to have been common among clerics of medieval Ireland. Cranes made good bodyguards. Columba's own bird was no exception to the rule. Thrusting its sharp bill out through the keyhole, it attacked the poor monk's eye. The wounded spy rushed off to Finnian, "with his eye lying along his cheek." Finnian, so the story goes, managed to restore the eye, whole, to its socket. That done, the Abbot descended upon Columba. Furiously, Finnian berated the younger man for having copied out his book. He demanded his manuscript back, and Columba's copy too. But Columba refused this last. Never would he give up his transcript, he proclaimed, because "the Word of God belongs to all." Hence arose the earliest recorded instance of a wrangle over copyright.

The matter was considered important enough to bring before the High King at Tara, at a solemn conclave. There, after long deliberation, the King pronounced: "To every cow her calf; to every book its transcript. The copy which Columba made belongs to Finnian!" Columba's blood boiled at the royal word. His priestly vows of humility went glimmering. "This is a wrong decision," he shouted, "and you shall be punished for it!" With that, Columba hurried home to Donegal and raised a rebel force amongst his kinsmen. His baptismal name means "dove" in Latin, but Columba had a Gaelic name as well. Some called him *Crimthann*, meaning "wolf," and not entirely without reason. Grimly, Columba led his troops against the King's own forces on the field of Culdreihmne. In the fierce battle that followed, 3,000 died. Columba won, hands down. He had now proved to his own satisfaction the justice of his case. But at the same time Columba had alienated most of his remaining colleagues in the clergy. Convoking a synod at



PHOTOGRAPH BY LEE BOLTIN

Impeccably crafted Ardagh Chalice, *made of bronze, gold, and silver, was already more than 1,200 years old when found in 1868.*

PHOTOGRAPH BY LEE BOLTIN

Bronze crucifixion plaque was created by early Irish Christian artisan in late seventh century.

Teltown in Meath, the Irish bishops laid a heavy penance on Columba's shoulders. For each man slain in the "Battle of the Book," they charged him to win a heathen soul to Christ. Exile from Ireland, plainly, was meant. By forcing Columba into missionary work, the Irish bishops dealt him out of local politics. Yet through the punishment he was to find freedom. Columba's true mission could now begin. Taking 12 disciples with him, he boarded a sailing dinghy made of cowhides stretched upon a wicker frame. Columba, at the tiller, set a course northeastward into the unknown. A brisk south wind favored the voyage. The sea sparkled. Columba wept and sang.

On May 13, 563, Columba's coracle nosed in amongst the gemlike feldspar and olivenite pebbles of Iona Island's southernmost cove. After helping to drag the boat beyond reach of the tide, Columba climbed a green hill nearby. His first concern was to make sure that not a tip of Ireland showed over the horizon. Deliberately, he turned his back on the salt wilderness between himself and home. The hill he climbed that day still bears the name *Cairn-cul-ri-Erin*, "Cairn-of-the-Arse-to-Ireland." Everything he needed for his colony lay at Columba's feet. Iona's 2,000 acres were mostly hill and heather, but they did include some meadows, sheltered from the wind, where wheat, flax, and vegetables might be grown. Her shores were rich in migratory seals, her offshore waters teemed with lobster, flounder, rock cod, and salmon. There were no trees, or almost none, but building stones lay all about. Columba's eye marked a huge flat boulder which had been brought to the island on the back of some antediluvian glacier. That boulder, he decided, was to be the Round Table of his warrior-missionaries, his 12 monks. They built their stone refectory around the rock.

Northward from Iona, little Staffa lay like a ship of smoke. At Staffa's heart, invisible across the water, was the columned sea-cavern known as Fingal's Cave. Strangely, a bonfire in the depths of the cave can be seen only from the highest point upon Iona, and some say that this phenomenon played into Druid rites before Columba's time. Near at hand to eastward stretched the wilderness island of Mull. And beyond that, he knew, lay "Alba of the Ravens"—Scotland.

It was not long before Columba penetrated Loch Ness to the palace of the Pictish monarch, dark King Brude. He is said to have outperformed the court wizards at sorcery. However the thing may have been done, Columba did win Brude's protection for missionary activity throughout Scotland and down into Northumbria. As the years passed, he established no fewer than 100 abbeys and 365 churches. Columba himself ordained 3,000 priests to man those sacred beachheads, through which he inevitably became a political and civilizing force. Columba personally picked the King Saul, as it were, of the nascent Scots Kingdom. His choice fell upon Aidan, an ancestor of the Stuarts, whom he anointed on the "Stone of Scone." The same Ionian boulder is at Westminster Abbey now; it remains the seat of British coronations.

One day, when he was sitting with his monks in the oratory at Iona, the book-satchels on the shelves lining the walls all crashed together to the floor. The monks were struck dumb by the falling of the manuscripts. Columba closed his eyes, then opened them and spoke: "Longarad, the master of every art, is dead in Ossary today!" A monk named Baithene, whom Columba had already selected to succeed himself as Abbot of Iona, interposed a pious wish that Longarad might survive a long time yet. Whereupon Columba, still a ready curser, burst out: "May your successor be a man of no faith too!" Needless to say, the saint was correct; Longarad proved to have expired. The incident also reminded Columba of an unpaid debt to the world. Sacred manuscripts, some of which he copied for his own use, had given the saint much. Unlike Longarad, he was never so selfish as to conceal his library. Yet neither had he multiplied it for others' enlightenment. So now Columba set his monks and himself to that effort.

Establishing the first known Irish scriptorium, he personally produced 300 illuminated Gospels, along with numberless psalters. Carried sometimes by pilgrims and again by missionaries, these were distributed as far afield as Italy and Spain. They inspired hundreds of artist-monks in far places to carry on such work. Thus, from abbey to abbey, the art of manuscript illumination leaped like unfolding light. The vellum codices created and inspired by Columba brought Christ home with banners to Europe, and lit up the dark ages from within.

Grimly, Columba led his troops against the King's own forces on the field of Culdreihmne. In the fierce battle that followed, 3,000 died. Columba won, hands down.

Do any manuscripts from Columba's own hand survive? A case can be made for the *Cathach*, or "Battle Psalter," which the O'Donnell family used to carry into war as a victory charm, but this is now too fragile to leave Ireland. Legend insists, however, that Columba

(*Continued on page 104*)

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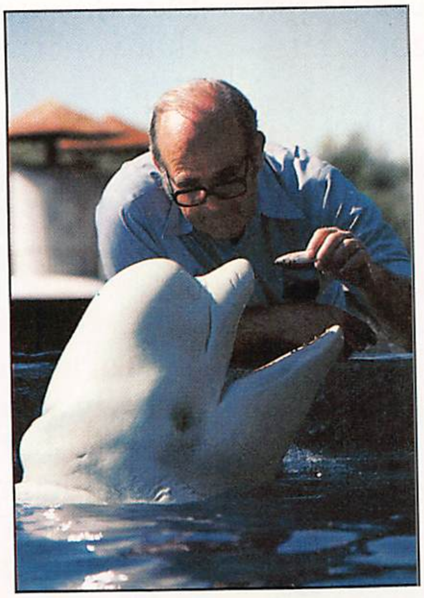
PROFESSOR OF WONDERMENT

What's it like to be a porpoise?

ANNIE GOTTLIEB



It is late afternoon on a high oak ridge near Santa Cruz. The air is filled with the sound of horseshoes, clanging and thumping, and with good, hungry smells—chunks of lamb from the professor's herd, bubbling in two iron kettles over a lively wood fire. The occasion is a meeting between the professor and his honors seniors in environmental studies at the University of California, Santa Cruz. They're supposed to plan a fifth-year study program. But so far this looks more like a party than a meeting. Clear-faced kids in country clothes are loading a table with homemade apple pie and brownies. Somebody strums a guitar, dogs dance in the sun, there is teasing laughter over by the horseshoe pit.

The distinguished professor has just missed a toss. With a good-humored oath, Kenneth S. Norris stumps off toward the long, low house that sprawls in an embracing arc on the seaward side of the ridge. He doesn't look like a professor: he's a stocky, fiftyish man dressed in baggy green pants and an old plaid shirt, his sleeves rolled above powerful, suntanned forearms. He doesn't look remotely like the personage I have come to meet: an eminent scientist, deputy director of UCSC's Center for Coastal Marine Studies, and a frequent adviser to government commissions on the environment. Instead, he looks—to my delight—like a gruff and amiable contractor, or maybe a commercial fisherman. I think at once of Frank Brocato.

In his popular book *The Porpoise Watcher* (Norton, 1974), Norris writes with warm admiration of Brocato—this wondrously competent Sicilian fisherman, who took him specimen-collecting in the early 1950s when he was the novice curator of Marineland of the Pacific, the second oceanarium in the world. No trace remains of the skinny, scared, formal young scholar who applied for that job in a spotless new suit, fresh out of the Scripps Institution of Oceanography and "filled with trepidation about how little I knew." During the past 25 years, Ken Norris has grown into his own description of Frank Brocato: "a wily professional, a prodigious worker . . . one of those rare people who could have been a success at virtually any occupation that opportunity allowed."

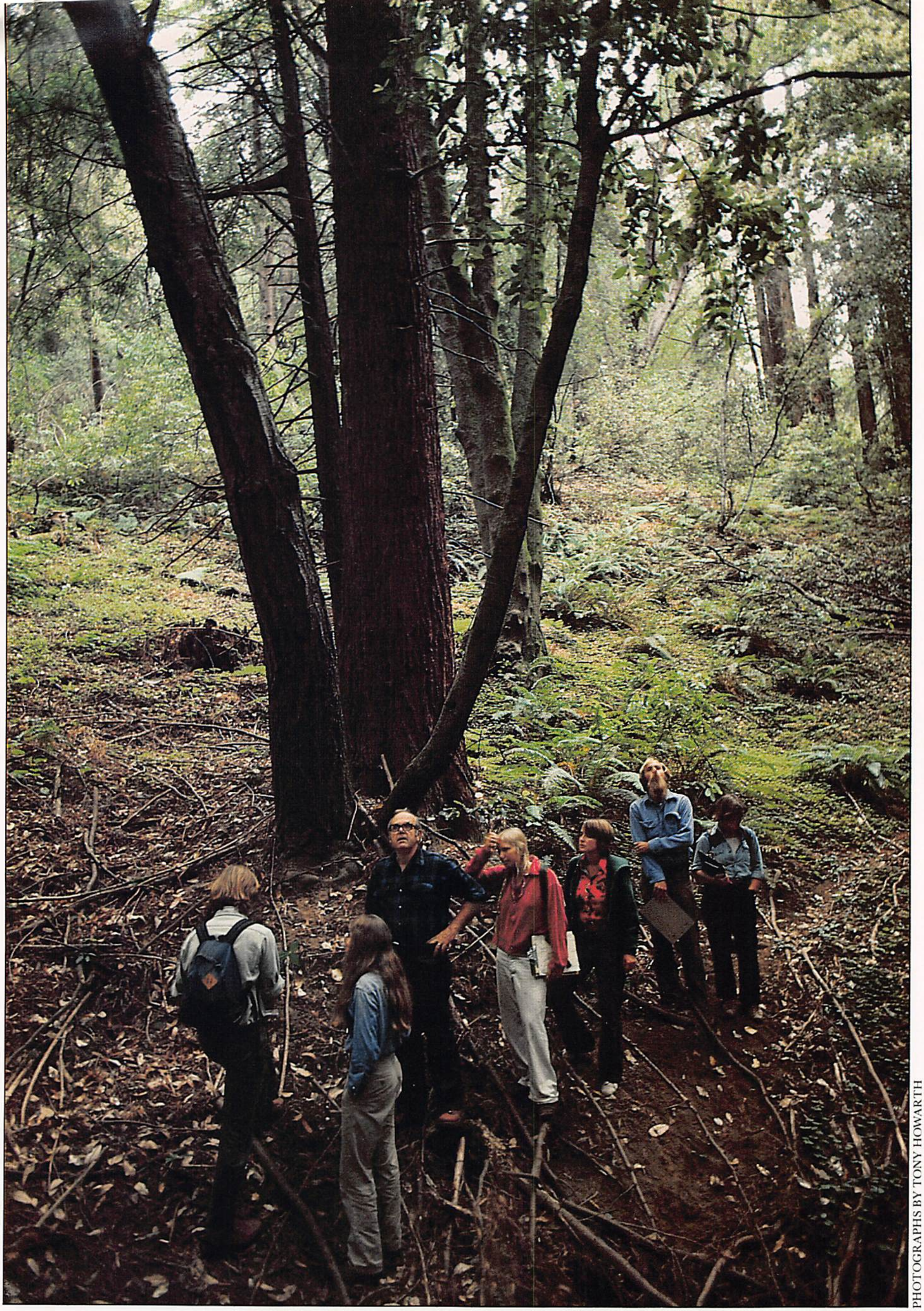
Norris is a man who waylays opportunities, mastering not one occupation but many. He has been, among other things, trainer and friend to porpoises; pioneer cetologist; prober of the minute ecologies of lizards, burrowing snakes, and tide-pool fishes; student of dunes and protector of deserts; inventor and impromptu engineer. To his own work or his ability to inspire others, we owe much of what little we know about cetaceans (dolphins, porpoises, whales). He made the first precise test of porpoise sonar, conducted some of the earliest field studies of cetacean social behavior, designed much of the gear that is now standard for capturing and studying cetaceans. He is responsible for much of what little we have in the way of rational environmental policy. He has clambered around inside a dead sperm whale's head to investigate its sound-production mechanism, skinned lizards down to their toes to find out why they change color, had himself towed through schools of wild Hawaiian porpoises in an underwater observation chamber dubbed the "Semisubmersible Seasick Machine," and argued before the Bureau of Land Management for a comprehensive desert management and preservation plan, and before Congress for the wilderness bill.

He has been a design consultant to oceanariums in San Diego, Hawaii, and Hong Kong, a member of the Scientific Advisory Committee of the U.S. Marine Mammal Commission, and a mediator between the forces for environmental protection and exploitation—as in the recent controversy over porpoise deaths in tuna seiners' nets, during which he went to sea for a month on the fishing boat *Elizabeth C.J.* to observe the behavior of both porpoises and fishermen. Add to these: indefatigable fund raiser, teacher—formerly at UCLA, currently chairman of environmental studies at Santa Cruz—sensitive writer, amateur artist, and matchless raconteur.

Norris goes on doing and being many of these things at once, as I learned with astonishment when I tried to arrange our first meeting. I asked for his schedule (*see box*), which he describes as one of "desperateness."

What kind of man is this, rambling around the fire, his expression quizzical and chronically pleased, stirring the

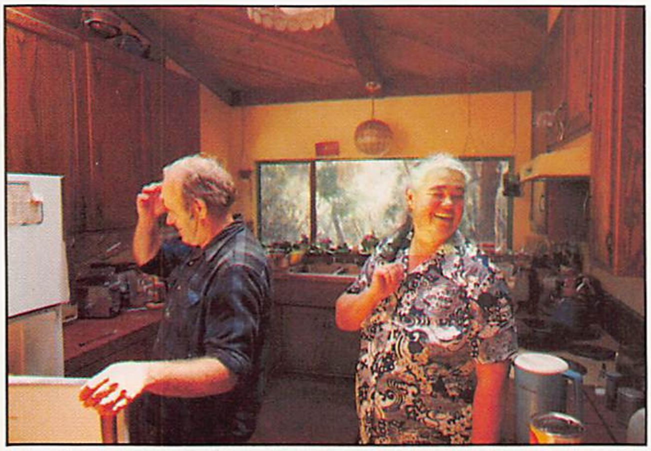
ANNIE GOTTLIEB, the editor of *Elima*, a literary magazine, is currently writing a novel about whales. She wrote the whale article in the July/August issue of *Quest/77*.



PHOTOGRAPHS BY TONY HOWARTH

stew and kidding his students, so unobtrusively but unmistakably the center of this gathering? I am looking for clues to what might have given him such uninhibited access to his capacities. In an age of specialization, most of us tend to identify ourselves by what we do: *"I am* a scientist, an artist, a teacher, an engineer." Ken Norris escapes such diminishing definition, and I suspect it is because his identity is not in question: he is what he is, himself, something versatile, vital, and unnameable, and the energy for whatever he does flows freely from that source. His philosophy seems to be: if something offers itself to be done, you do it. If you don't know how to do it, you learn how by doing it, whether it's catching a pilot whale on the open sea, building an oceanarium exhibit, or shearing your own sheep.

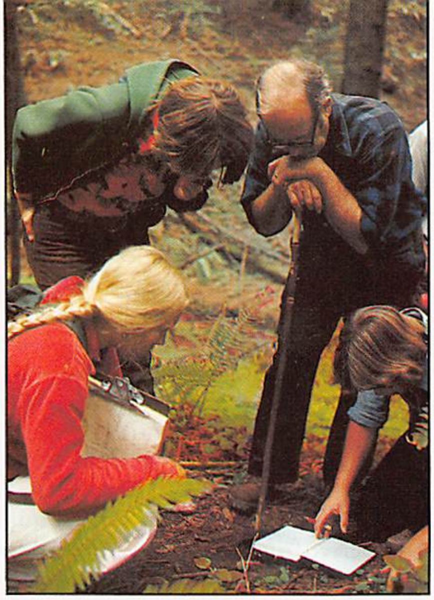
"Ken's a great do-it-yourselfer," says Phyllis Norris—a quietly substantial, welcoming presence, her eyes and mouth crescents of calm laughter. The three out of four Norris children who live at home look like her. "His attitude is, why get someone else to do something for you if you can do it yourself? He'll shear the sheep with a book in one hand or someone reading him directions. Two hours later the shears are dull and the sheep half done. We have patient sheep. We also have scalloped sheep." The whole family helps deliver the lambs, but it is Ken who slaughters them. "As a family," Phyllis says, "we're all grateful that Ken is willing to do this." She also tells me that they can't prevent a pair of hawks from preying on their guinea-fowl chicks, and somehow the two images merge in my mind: Ken and lamb, hawk and chick: forces of nature. An education for a naturalist's children.



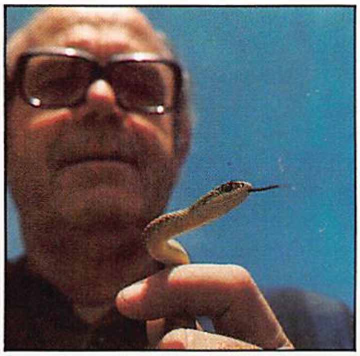
Over coffee in the kitchen, with its tangle of plants and great panels of glass set in the ceiling, Phyllis tells me that she and Ken and the children designed this house in 1973, living in a trailer on the 35-acre site to oversee its construction. The house is spacious and graceful, yet the feel of it is cozy, cluttered, and exciting—part attic, part menagerie, a child's dream. I wander about, taking inventory of a fraction of Ken's beloved "junk": three tiny wild birds' eggs in a jar lid, wind chimes, a gray parrot clambering in a huge cage, two massive whale vertebrae mounted over the brick fireplace, a wall collage of a harbor scene made by Ken out of wood scraps collected in Chile, Indian masks and baskets and pottery, a staring, four-foot wood-carved alligator, a case of rare beetles, old prints of marine mammals with many curious anatomical distortions, open books (*Microclimates, Lads Before the Wind*) and a double-sight microscope on the table, to which Ken's at-home children—Nancy, 21, Barbara, 19, Dick, 17—may at any moment bring an unidentified blossom. In one window, an abstract dolphin leaps in a panel of stained glass; it is obvious that the maker's hand intimately knew the lines of a dolphin's body, and indeed, she is Norris's oldest daughter, Susan, 23, now a violin maker in Portland, who helped him train porpoises in Hawaii when she was 10. The kitchen window is an airy cage for finches, lovebirds, and quail, with a dovecote for homing pigeons built in above it. The cooing and wing-thunder of their comings and goings form a constant background to the talk outside by the fire.

The students perch attentively on logs as Ken outlines the proposed field studies in new university reserves in the Granite Mountains and the Mojave Desert. He has been a

"The world is systemic, not linear, and all things in the world are related as parts of a system."



"You have to focus down and down on details until you arrive at a whole new understanding of the conditions of life for a given organism."



primary architect of the University of California Natural Land and Water Reserves System, a 10-year-old statewide plan to preserve wild environments for study and teaching, and the current plan is pure Norris: the students will learn by doing, "for cheap," essential base-line studies for the Bureau of Land Management. And now, I watch as Ken's clarity and seriousness emerge from beneath the baggy costume, the curmudgeon's sense of fun. It is not an abrupt shift: scientific rigor is introduced so gently that it seems no more than a sharpening of the spirit of play. "It's an important thing to do, but I don't know how on earth we're gonna do it. . . . I'm concerned that what you see and what goes down on paper is right. It's a mark of professionalism to spell the Latin names right. . . . Be careful to indicate what you do and do not know. That's the nature of professionalism. That's the whole bag. The minute you start fakin' it, we've had it."

A wily professional, indeed. While Ken seems genuinely at home among these kids, I sense that he is also a master of appropriate disguise, who knows his audience. He is in extraordinary, open control of his relations with people—a mixture of warm perception and cool purpose that must perplex anyone exclusively ruled by either the heart or the head. I've been on the receiving end of it myself. Tickled by Ken's poker-faced tale about a pretentious colleague, I realize only tardily that I have been scanned as neatly as a porpoise sizes up a fish: What kind of journalist am I? Will my presence be harmonious or intrusive on the Sierra field trip on which I am to accompany Ken's class?

This "control" has an utterly different quality from the rigidity of the authoritarian; it seems to stem from that same nameless certainty about himself that makes Ken so undefinable and vital. With little evident need for the self-image to which most of us devote so much anxious attention, he is free to be remarkably aware of others. "One of Ken's amazing qualities," says a student who has worked closely with him, "is that he tunes in to everyone on their own wavelength. Not only is he able to be tuned in to 25 different intellects at once, but he's aware of the emotional state of everyone in the class." Yet he never loses sight of his own purposes, which seem to be governed to a rare degree by a detached and constructive intelligence. It's a kind of benign manipulation—in the case of his students, a *loving* manipulation, calculated to open their attention and put them in direct contact with nature. In the literature of the East it's called "compassion," a word which has a certain salutary ruthlessness, shorn of the sentimentality we invest in it. Ken reminds me of a cagey old Zen master.

If this quality makes him an exceptional teacher, it is also the secret of his success as a program initiator, fund raiser, and environmental diplomat. "I can speak to congressmen and university administrators, I understand and sympathize with fishermen," he told me. "I understand businessmen because I've been in business [as a design consultant]. I guess there's a bit of the salesman involved. It requires a communications exchange, trying to understand the constraints on others, the systems they're in. It's a route to accomplishing what you think is important. I've been on the board of the state Bureau of Land Management as an environmental education member, and I've seen how agencies like that get every special-use group fighting each other—planning by decibels, that is, who yells the loudest. That's why compromises don't come."

Compromise is one of those words Ken Norris uses that

> "Is that a digger pine?
> The cones look too small.
> Which is the boy and which is the girl,
> or don't they do that?"

may not endear him to impassioned environmentalists, but that make him one of their most effective allies. *Management* is another. The sea otter is a "depleted" species, with 1,500 to 2,000 left living in the rocky harbors and kelp beds along the southern California coast. Agile swimmers and dexterous shell-crackers with winsome faces, they are frequently shot by abalone and sea-urchin fishermen, whose livelihood competes with the otters' diet. Ken is a member of Friends of the Sea Otter and an active intermediary between that group and Governor Brown's administration. "I signed up with the Friends because I agree with them in general, but I also believe there has to be some spirit of compromise. They want complete protection. I don't believe in that; the fisheries have their place, too. But we mustn't threaten this little otter with extinction. The Department of Resources must be made to manage responsibly."

It's a recurring counterpoint in his thinking. "I'd like to do some writing about the natural history of the desert and the problems of management to protect that fragile environment. Arid lands cover 14 million acres of California, and it's the biggest unexploited resource we have. It's less utilized than the desert in Israel, where they've developed a drip-trickle agriculture that uses just tiny amounts of water between salt layers. And there's this magnificent natural biota we have to protect. We have to *plan.*" Management and protection, human use and the integrity of wilderness—such opposites come easily to Ken Norris in the same breath. He sees this approach as the only alternative to chaotic and unchecked exploitation. Perhaps because of his own paradoxical temperament, he hopes to turn the futile clash of value systems into an orderly process of change.

He speaks with qualified approval of a new International Whaling Commission policy that will divide the world's whales into four different "management stocks," permitting limited killing that would not deplete any population below "maximum sustainable yield." But the MSY concept defines nature strictly as an economic resource, measuring it by quantitative cost-benefit analysis. Norris is pressing the Marine Mammal Commission to accept an alternative policy: "optimum sustainable population." OSP would allow for the qualitative benefits we may derive from a living species or a wild tract of land: its beauty and wonder, its vital place in the web of life, or what it can teach us about natural interactions and controls. MSY is of the old world-view; OSP embodies the transition to a new. Ken Norris stands between them.

Much of his personal sympathy lies with the new ethic of environmental protection: "I'm in love with the land in a very real sense, a very deep sense. I've seen the matrix of life, how subtle it is, and to see it destroyed could make me sad for life." Yet he knows this new ethic hasn't a prayer unless it respects the needs and expertise of fishermen and loggers, cattle grazers and coal miners—provided these groups, too, act in good faith. His article on porpoises in the February 1977 *Smithsonian* is a case in point. He praised the tuna industry for its efforts to save porpoise lives, but said it had not gone far enough. The industry responded by faltering in its research and seeking more good press, and that bothers him. But under federal mandate it has also taken some of his suggestions: seiners are now using new nets that allow porpoises to free themselves, and a man in each seiner swims within the net when it is being

A Week in the Life of Kenneth S. Norris

From his memo to Annie Gottlieb:

"Here's last week. I raised money for the marine program; set up nature trails on campus; talked to lawyers about two porpoises that were let go in Hawaii; made arrangements for a workshop I will lead in Hawaii on harassment by photographers and divers of the humpbacks breeding there, plus the effects of hydrofoils, etc. I met with students; set up committees for selecting a new ethics staff member; raised money for student interns; wrote a grant request to set up an interface between state agencies and our environmental studies-marine program; looked at the boat I've just been given which we will sell to get a trailerable boat for my porpoise field work; sang songs in the office; drank a little wine; finished the review of a survey of humpback whales by the marks on their flukes; drew up a gift plan so we can seek a little slice of land that has a live stream on it to the west of campus, for our nature system; accepted a speaking engagement to the California Academy of Science annual Fellows Banquet—a big deal. I'll talk about 'What's it like to be a porpoise?'

"I turned down another speech in August because I have a family reunion, and because I'd rather dig potatoes in the summer. I set up the equal opportunity machinery for all our temporary appointments this fall. I took part in the oral exams of two of my students; they both did well and I am very pleased. I tried to catch up on mountains of correspondence built up during my field quarter; it seems to come in bales. I tried to keep the campus farm and garden from falling apart (it is having support problems, but many of my natural history students want to know about small-scale agriculture as an alternative social direction). I bought chicken food and boots (mine fell apart hiking in Tuolomne). I sent off letters on the value of Big River as a state park (rather than having the estuary logged). I rounded up a pile of notes and photographs I took of porpoise skulls in Chilean museums, and sent them off to a friend who wants to work on them more than I do. There were lots of students in and out, with counseling problems, some with senior theses, including a jewel on composting that should be published. There were two or three parties, and stuff like that. It was a busy week."

Telephone Answering Breakthro

Let a new remote control answering computer free you from your next telephone call.

The new Ford Code-A-Phone 1400 answering computer.

It's a telephone answering computer. The Ford Code-A-Phone 1400 has the first large-scale integration of solid-state componentry —a major change in telephone answering systems since the first mass consumer models appeared five years ago. This means more features, lower cost and greater dependability. Here are some of its exciting features:

Forget about tapes There are no tapes to buy. The Ford unit has a special polymer-based magnetic tape that will record over 25,000 phone calls without replacement. That's over five solid years of use. There are no cassette tapes to buy, wear out or replace.

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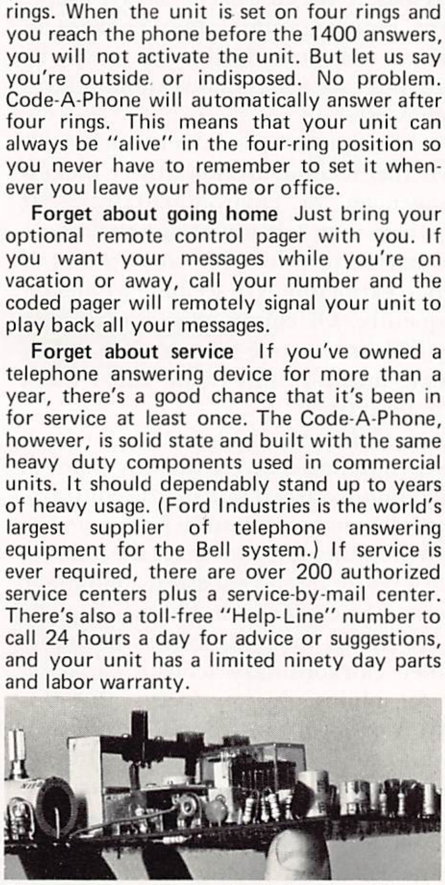
Forget about touching it You can adjust your unit to answer on either one or four rings. When the unit is set on four rings and you reach the phone before the 1400 answers, you will not activate the unit. But let us say you're outside or indisposed. No problem. Code-A-Phone will automatically answer after four rings. This means that your unit can always be "alive" in the four-ring position so you never have to remember to set it whenever you leave your home or office.

Forget about going home Just bring your optional remote control pager with you. If you want your messages while you're on vacation or away, call your number and the coded pager will remotely signal your unit to play back all your messages.

Forget about service If you've owned a telephone answering device for more than a year, there's a good chance that it's been in for service at least once. The Code-A-Phone, however, is solid state and built with the same heavy duty components used in commercial units. It should dependably stand up to years of heavy usage. (Ford Industries is the world's largest supplier of telephone answering equipment for the Bell system.) If service is ever required, there are over 200 authorized service centers plus a service-by-mail center. There's also a toll-free "Help-Line" number to call 24 hours a day for advice or suggestions, and your unit has a limited ninety day parts and labor warranty.



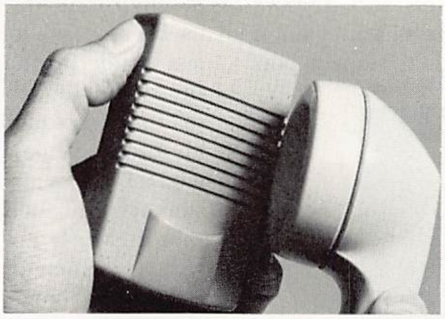
The entire printed circuit-board with its integrated circuits is easily replaceable and contains the "Brains" required to control the audio amplifier and tape transport system.

PLENTY MORE FEATURES

Code-A-Phone has a monitor feature—you can listen to the caller leave his message and pick up the phone to intercept the call. If you want to skip over a message on the tape, just tap a button and it fast-advances to the start of the next call. It has a selectable erase feature that lets you erase a specific message or the entire tape if you wish.

KNOW HOW MANY CALLS

With other answering machines, you never know how many calls you receive until you play them back. With Code-A-Phone you have a call counter—a device that displays the exact number of calls you've received when you arrive home. If you now own another answering machine, you can really appreciate this convenient and exclusive feature.



Hold the small pocket-sized remote-control pager up to any telephone in the world and you can playback all your messages.

Code-A-Phone is the first really versatile answerer that works equally well at home or in the office. It's perfect for the busy or working housewife who spends little time at home. And, if she's home and just plain busy when the phone rings, she can always call back later without offending the caller.

The executive can now leave his office, call from the field and get all his messages. An inefficient operator at a telephone answering service may offend your customers by putting them on hold. Code-A-Phone, however, takes your message quickly—without delay.

There are very few people who haven't left a message on a telephone answering machine, and callers really appreciate the convenience.

NO PHONE COMPANY TARIFFS

Code-A-Phone is equipped with an FCC-registered interconnect device so your unit is actually welcome on your phone line. The 1400 comes with a four-pronged plug so you just plug it into your phone jack. If you don't have a phone jack, just call your phone company and tell them you are purchasing an approved Code-A-Phone and that you want a four-pronged jack for your phone. They'll know exactly what you want and charge you around $12 for the installation, depending on where you live. If you have a multi-line phone, they can install a jack to tie into any or all of the lines you wish. There are no additional monthly charges.

STANDING BEHIND A PRODUCT

JS&A lets you use the 1400 in your home or office for one full month. Use it to screen your calls, take messages while you're gone or as a back up system when you're busy. Use the remote pager and retrieve calls while you're out. See how easy it is to change the message in seconds, and see how much it uncomplicates your life. Use it under your everyday conditions at home or at your office and then decide after one month whether or not you want to keep it. If you decide to keep it, you'll own the best. If not, return your unit for a full and prompt refund. There is no risk. Even if you already own a phone answerer, it would pay for you to see how much better the Code-A-Phone performs.

JS&A is America's largest single source of space-age products and a substantial company —assurance that your purchase is protected.

The Code-A-Phone comes in two models: the Remote Control unit for $259.95 called the 1400 and the same unit without the pager but with all the other features for $179.95 called the 1200. Simply select the unit you want and send your check for the correct amount to the address shown below. Credit card buyers may phone in their orders by calling our toll-free number below. (Illinois residents add 5% sales tax.) **There are no postage and handling charges.**

By return mail, you'll receive a Code-A-Phone complete with all connections and instructions (extra pagers are available for remote unit) plus your ninety day limited parts and labor warranty. The unit measures 3¼"x 8½"x 12" and weighs six pounds.

Code-A-Phone compares to units that sell for much more but do not have the simplicity and the advanced electronics. Don't be confused. Code-A-Phone is the finest telephone answerer you can buy at any price and is years ahead of all other conventional systems.

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hauled in, to help the porpoises escape. (Estimates now in have porpoise deaths at one-fourth of what they were last year.) Other of Norris's suggestions (such as the purchase of a research vessel) have not been followed, but he is quick to tell me that Congress is partly at fault, in not providing research funding.

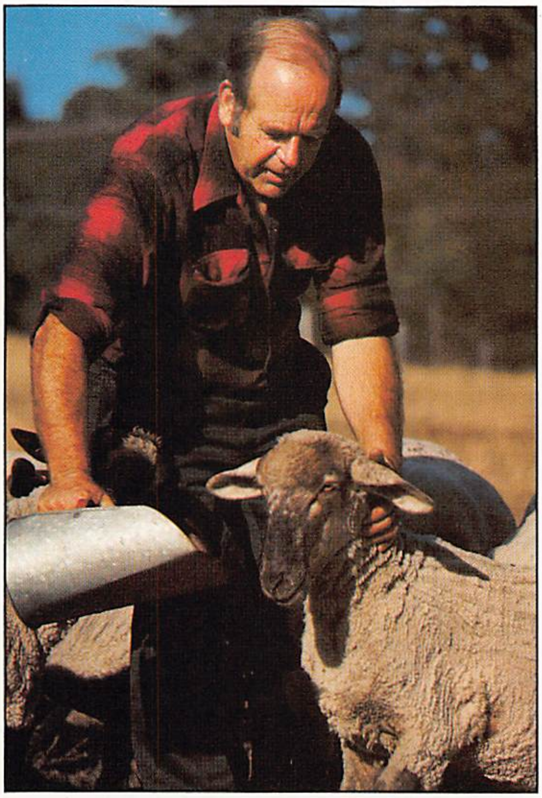
By and large, Ken regards fishermen and miners and other "exploiters" as part of nature: he thinks their claim to life and livelihood is just as real as that of the creatures they "exploit." He understands them too, in a visceral way. So the contradictions of the environmental dilemma run deep in his own life. He can resolve them in the world to the unusual extent that he resolves them in himself.

Speaking of the "social decision" he would have us write into the law on each contested species—"We are going to exploit this animal for its fur," or "We are going to protect it and simply look at it"—Ken muses, "How do you *make* such a decision? It's a real ethical barbed-wire tangle, and I don't feel terribly confident that I can untangle it. I don't know if it's ethical to grade species in terms of intelligence. How do we fake ourselves into thinking sheep are stupid beings? I've got sheep out there that are my *friends.*"

"And you slaughter them."

"Yes, I do." He gives me a mild, challenging stare. "And I don't know if whales are different."

The resolution, then, seems to lie in Ken's not seeing the ethic of use and the ethic of appreciation as inherently contradictory, any more than ruthlessness and nurture contradict each other in nature—or in Ken's nature. Good use is appreciative (as the best tuna seiners respect porpoises and know they need them); true appreciation is a kind of use. Ken feels that humans must care for nature precisely because we nourish ourselves physically and spiritually from it—because we are a part of it. A "pure" environmentalism that excluded us as alien plunderers would only repeat the fundamental error of the old ethic of careless mastery. It would deny the truth that Ken sees as the very force of the "new ethic"—"that the world is systemic, not linear, that all things in the world are related as parts of a system," including ourselves and our needs.



"How do we fake ourselves into thinking sheep are stupid beings? I've got sheep out there that are my *friends.*"

Truth is an important word for Ken Norris. For him it means something real and discoverable, at once the goal of science and the ground of morality. Truth is crucial to survival in at least two ways: we need detailed information about nature and candor about our own motives. Ken's whole effort is to increase the supply of these two rare commodities in a world dying for want of them.

He is a persistent agitator for government-funded research—on whales, for instance: "We don't even know where the migration routes are. How can we count 'em? NASA has developed magnificent capacities for remote sensing; polar satellites cross *every piece* of the world twice a day! Why couldn't they be used to track whales? It can be done, the technology is there—it needs refinement, application, support!"

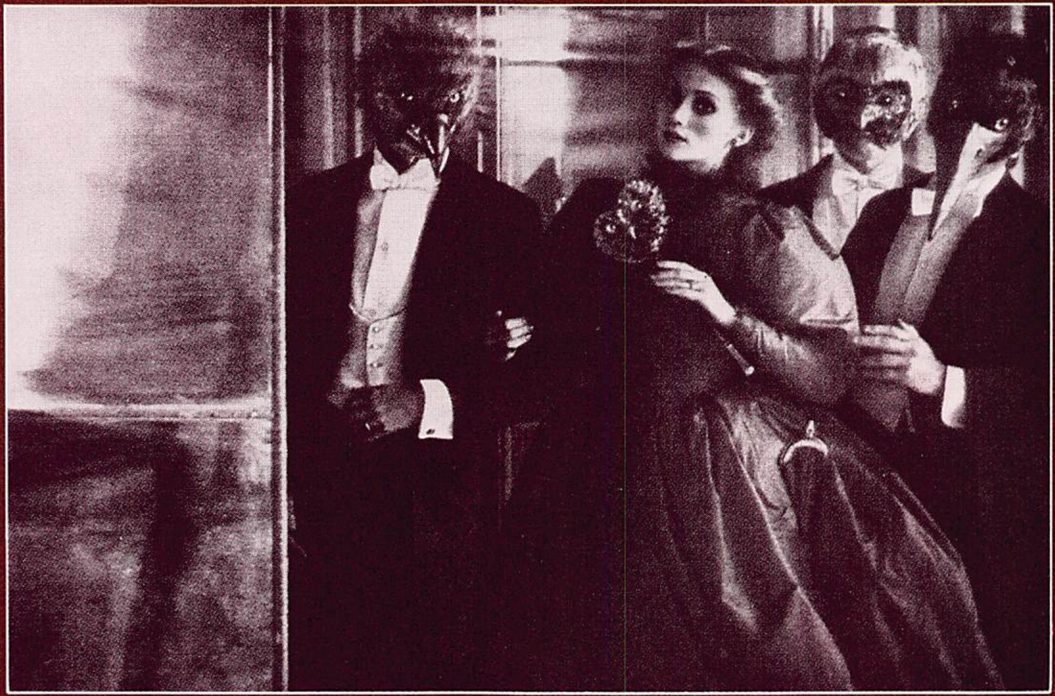
He spends much time gently correcting the romantic exaggerations (and sometimes the "guff" and "baloney") of environmentalists, which, though sincere and even useful as forces for change, are in his view less useful and less wonderful than the truth: "How involved am I in the mysticism about whales—those magnificent beings in the sea that sing songs? The answer is: *a little.* I know too much about the animals. At least in the case of the baleen whale, what I see is a large grazing animal that engages in stereotypical behavior—seeks out krill and opens its mouth. Myths are fun, but I see a marvelous animal that's still very much of a mystery."

He is far harsher with what he sees as deliberate, self-serving distortion, whether it comes from industry spokesmen, government agencies, or environmentalists: "It really turns me off when they tell lies about the whale situation. I see little reason to think that any species of whale is being driven to extinction. We see blue whales off our coast quite frequently. Of course they are terribly depleted, one twenty-fifth or even one-fiftieth of what they used to be, and people mustn't hunt them. But I don't think they're going to be extinct."

But if Ken's concept of the truth is stern, it is far from austere. To get one's own fantasies out of the way is not to see a world barren and impoverished but, on the contrary, to open oneself to the full wonder of nature. Ken, who has worked so closely with dolphins, does not share the fanciful speculation that they have an intelligence and a language comparable to our own; the evidence, in his view, simply doesn't support it. He thinks their big brains probably relate primarily to their extraordinary acoustic capacity, not to a penchant for philosophy or poetry. But this avoidance of fantasy "doesn't mean I don't let my own emotions get involved; I do. I think you have to. I don't believe animals are automata. That was holy writ for years, and I've objected to it. There's no question that dolphins have emotional lives and reasoning power, and I don't feel a *bit* frightened about saying so." He writes

(*Continued on page 110*)

PHOTOGRAPHED AT THE HALL OF MIRRORS, VERSAILLES



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GLORIOUS LUNACY

When men were men, and cars were cars

MARK SUFRIN

On a bitter winter day, February 12, 1908, a quarter-million New Yorkers jammed Broadway north from Times Square, awaiting the start of the longest motor race in history. It was the 13,341-mile run from New York to Paris, over a route that led west across America, by ship to Alaska and Asia, then overland across the frozen Siberian wilderness into Europe—a route that would take 169 days to finish. Sponsored by the French newspaper *Le Matin* for a $5,000 prize and a gold cup, it is still the most grueling test ever devised for man and machine.

The six cars—an entry each from America, Germany, and Italy, and three from France—edged through a lane held open by mounted police. As the American Thomas Flyer moved up slowly, the great crowd went wild and tried to break through the cordon. It was an emotional, patriotic swarm, but few gave the Thomas the slimmest chance against the others. The European entries were crack machines with superbly trained crews.

The Thomas looked like a lumbering Conestoga wagon, and, perched high behind the wheel, driver George Schuster, 35, chief road tester for the Thomas Company, was a contrast to the younger, rakish foreigners. With his spare frame, bland face, ordinary work clothes, and boxy high shoes, he was a caricature of the Yankee rube. (Montague Roberts, the famous racing driver, alternated with Schuster until the car reached Wyoming, where he was forced to leave the race because of prior commitments.)

Schuster glanced at the German car, a Protos, the machine to beat. The driver was Lieutenant Hans Von Koeppen, a dour, mustachioed Prussian wearing a dress uniform, leather greatcoat, and helmet. Schuster was a dogged man, an innocent, and for a time he underestimated Koeppen's slyness, his mania to win, and his brilliance as a driver. It was this striking difference between the two that gave their rivalry an epic quality.

At 11:15 a.m. a starter fired his pistol and the great adventure was on. Speeding toward the outskirts of the city, the Thomas and Protos set a fast pace, hanging close. Hitting open country, the Thomas shot into the lead to the cheers of Schuster, Roberts, and passenger T. Walter Williams, a *New York Times* correspondent.

The Protos was a mile behind. Trailing were the Italian Zust and the three French cars, a Motobloc, a Sizaire-Naudin, and a DeDion carrying Bourcier de St. Chaffray, liaison man for the sponsor. Crowds, bands, and flags lined the road into the Hudson valley as the racers headed north for Albany on the first leg. The cars were rocking at a jaunty speed and the race seemed a marvelous lark.

The original route was glorious lunacy. The cars would cross the continent to Seattle, push north through Canada and Alaska, cross the iced-over Bering Strait to Siberia, traverse the frozen tundras into Europe, and speed to Paris

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via St. Petersburg and Berlin. The race committee arranged for caravans to be dispatched through primitive country to deposit gasoline stores along the way, bringing news that "Mad white men are coming in carts that move by magic." The distance was estimated at 19,200 miles, and to insure success the start was in the dead of winter.

From the moment the plan was announced, it was ridiculed by experts: the Bering Strait was a wilderness of broken ice, crags, and crevasses that would break under the overloaded cars . . . thousands of miles of trackless stretches in Alaska and Siberia were unexplored . . . in northern Siberia, the Chukot Mountains were sheer ice slopes, the first 1,000 miles lacked human settlements, and it was almost 4,000 miles to the first big town.

The race committee was forced to change the route. The cars would drive to San Francisco, ship to southern Alaska, cross overland to Nome, ship across the Bering Strait, and then follow the original route. Even this plan was further altered as the harrowing comedy unfolded.

Twenty miles outside the city, the sky darkened and the snow began. A gentle flurry at first, it lashed into a bad blizzard. The road turned icy slick and Schuster fought to keep the Thomas from skidding. Once, the rear slued and the car slipped out fast toward a ditch. He kept swinging the wheel and with a feather touch on the brakes was bringing it to a stop. Suddenly he saw headlamp beams prying through the snowfall. It was the Protos coming on at breakneck speed despite the treacherous conditions, and Schuster had to hang the Flyer on the edge of the embankment to avoid being hit. The Protos swept past and disappeared into the storm. Then Schuster knew he'd have to be wary of the man, never give him a moment's advantage in the thousands of miles ahead.

The Zust, driven by the dashing Antonio Scarfoglio, took the lead 30 miles out, but then its transmission chain broke and the radiator cracked. The Italians made repairs, but the other cars flashed past, with the Thomas and Protos fighting for front position on the twisting roads. The DeDion and Zust trailed, and the Motobloc lay tilted and half buried in a snow-filled ditch. It took the French crew six hours to dig out.

Fifty miles from New York, the Sizaire-Naudin quit the race with a broken differential. The Zust caught the leaders, only to have another chain break. The Thomas Flyer and the Protos were hitting flat out through the snow, Schuster trying to open up ground and keep Koeppen away from him as the cars tore through the highland country. As night fell and the storm increased, both cars lost the road and bogged down together. Koeppen shrewdly waited until the Americans broke free after backbreaking work, then careened along the path and flashed past Schuster. But the crews were forced to spend the night at Hudson.

The second day, wind and snow still streaking in, the cars were reduced to a crawl. A crew member waded ahead on foot to test the snow depth with an alpenstock and guide the driver. The men tunneled through giant drifts that collapsed and almost buried them alive.

> Schuster was a dogged man, an innocent, and for a time he underestimated Koeppen's slyness, his mania to win, and his brilliance as a driver.

It was only a hint of the terrible rigors ahead. One motoring journal asked: "What will happen when the intrepid adventurers do get outside civilization?" But the crews were undaunted. Extraordinary men in an age of unbounded optimism, they were confident their cars could meet the challenge.

The Protos was the product of German General Staff planning—the automobile had great military potential. It weighed over 6,000 pounds and was powered by a sturdy four-cylinder, 40-horsepower engine. Extra wide, it had crosswise sleeping space for the crew—Koeppen and two other army officers, who had trained for months. Six fuel tanks holding 176 gallons were shaped around the Protos, enough for more than 2,000 miles. It had been tested over the worst terrain in savage weather and repeatedly modified and improved.

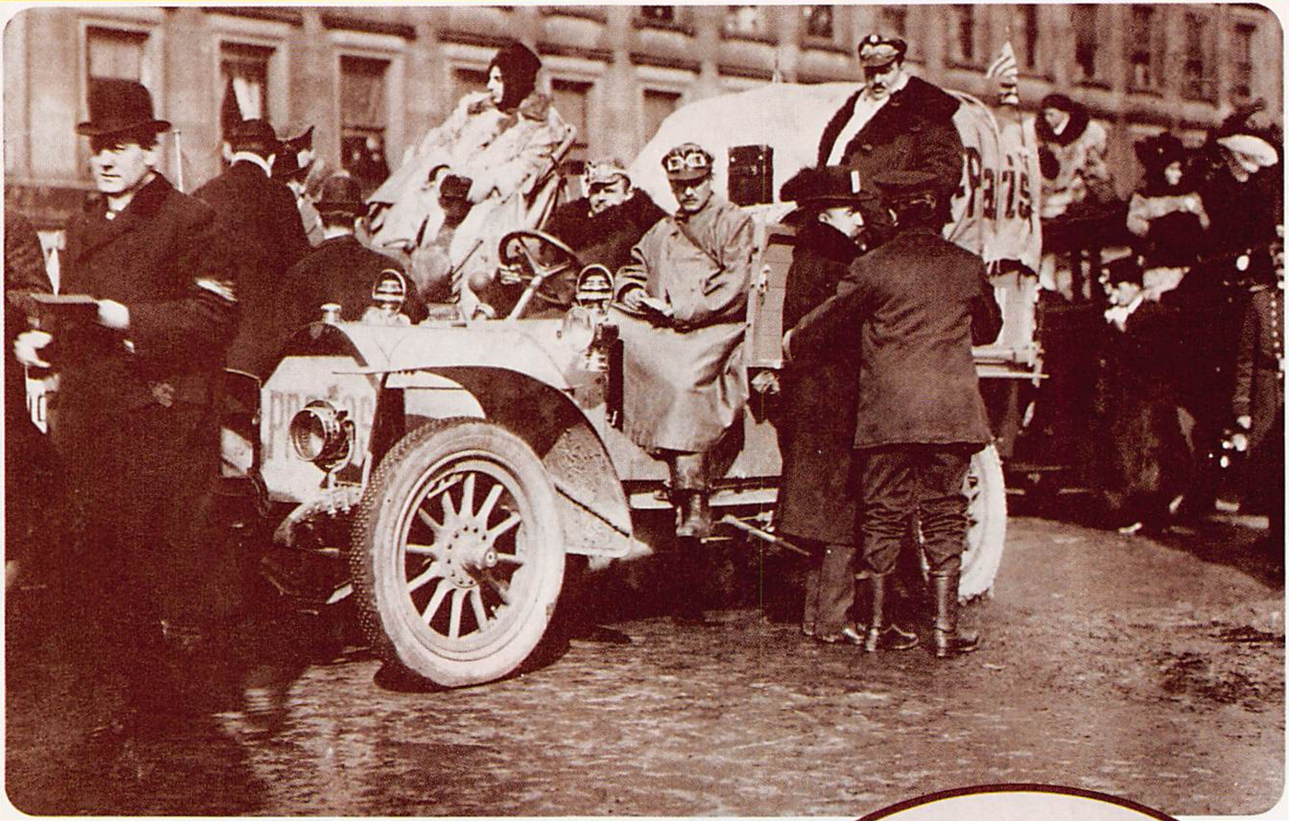
The DeDion, another hippo of a car, was insulated against Arctic cold with soft wood wrapped in felt and covered with rubber. It was the first car with a heater and had enormous gas capacity. A mast and sail rigged by crewman Hans Hansen, a Norwegian explorer, would be used for added speed across the tundras. Most of the Europeans carried a complete mobile workshop. The Motobloc's rear had an immense chest of drawers holding panniers of champagne in addition to the necessities. The Italians in the Zust, however, had vowed to forgo wine for the duration of the race.

There was no American entry until three days before the start. Then the E. R. Thomas Company's Buffalo plant selected an ordinary production model: a four-cylinder, 70-horsepower Flyer with a four-speed transmission and double-chain drive, capable of hitting 75 miles an hour—actually the fastest, lightest, most powerful car in the race. There were frantic preparations. The fenders were stripped and replaced with two rock elm planks for tracking out of mud and snow. An extra gas tank was fitted behind the front seat, another strapped to the back under the spare tires. An extra double-bucket seat was mounted at the rear, and iron hoops for a canvas hood gave it an ungainly look. Holes were drilled in the floorboard to let engine heat through. A new axle to give the car higher road clearance wasn't fitted until the Flyer passed through Buffalo after the start.

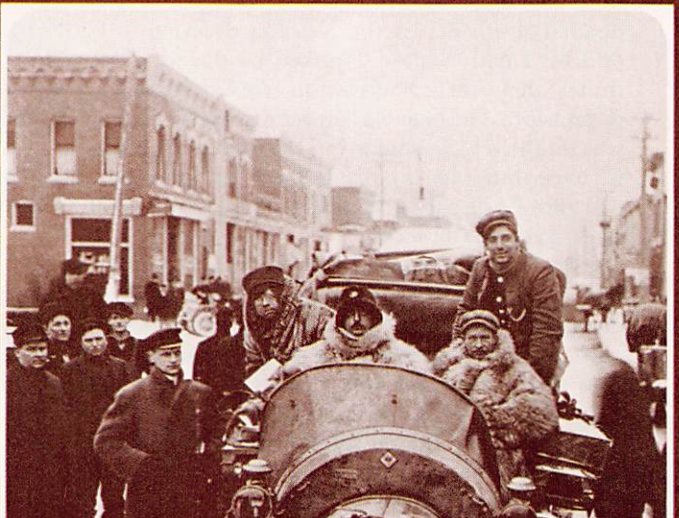
The Thomas headed across New York State, was overhauled at Buffalo, where it also picked up a mechanic, George Miller, and left nine and a half hours behind the Zust. The Italians were plagued with breakdowns, and the Thomas and DeDion shuttled out front. The Protos was 44 miles back, the Motobloc 125. In Ohio, Koeppen made a sly move. He stripped the Protos, sent the impedimenta ahead by rail, and began gaining ground until almost within sight of the Thomas. But no matter what Koeppen tried, the heavy Protos lagged again as Schuster opened a tremendous lead.

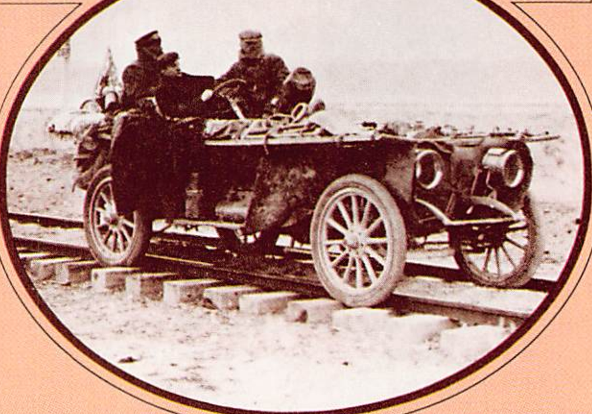
The Italians drove without sleep for two days, huddled against whipping gales of sleet, and Scarfoglio began to doze at the wheel. The car skidded and flipped into a ditch, hurling the crew into deep snow. In agony, fumbling with icy hands, they dug the car out with a superhuman effort and righted it. They tried to thaw the frozen oil and water with a blowtorch, but they were weak and shivering, and they slumped into the snow and fell asleep. Two men

PHOTOGRAPHS COURTESY OF TOM MAHONEY



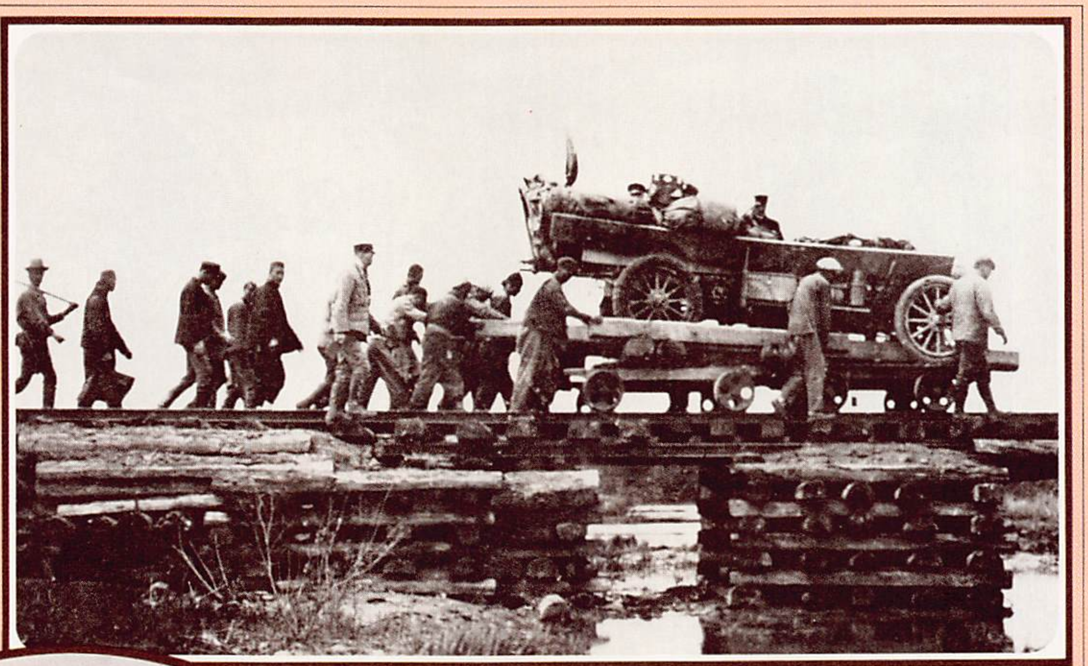
The German Protos in Times Square at the beginning of the race. Lieutenant Hans Von Koeppen is in the leather coat.

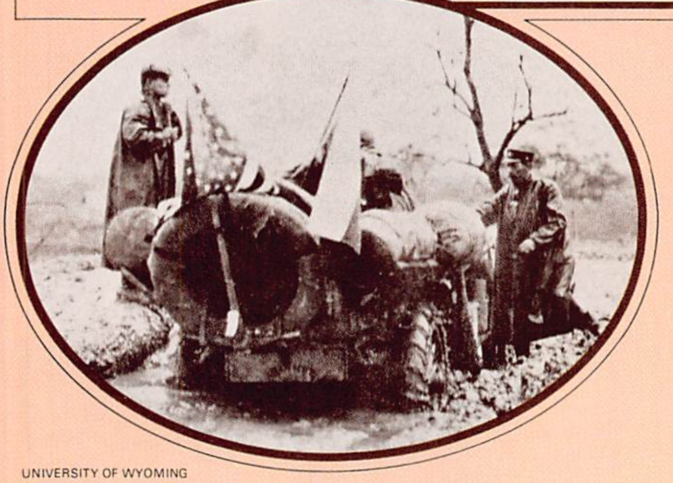




The Italian Zust leaves Buffalo first (left). *The Thomas becomes a scheduled train across Utah* (above).

The crew of the Thomas—Hansen, Miller, MacAdam, and Schuster—en route from Seattle to Japan.





The Thomas is balanced on handcars and pushed across a temporary railroad bridge in Manchuria (right). *After hauling out the Germans* (below), *the Americans get stuck in a Siberian mudhole.*

UNIVERSITY OF WYOMING

found them before they froze to death, and the next day, February 22—after breaking their temperance vows—the flamboyant Italians were flying after the leaders.

The Thomas was first into Chicago on February 25 and left three days later. The Zust and DeDion trailed by a day. The Protos was nine days behind. West of Chicago, rain softened the frozen winter mud into a tideless sea of gumbo. The capricious weather was maddening. One day frost turned the prairie into a hard speedtrack; the next, warming winds made it a nightmare of sucking mud that exhausted the floundering crews as they pushed the dead weight of their stalled cars. The *Times* correspondent left the Thomas in Cedar Rapids. He had had enough.

As spring drew close and the ground stayed firm, the Thomas began to make a farce out of the race. It roared into Cheyenne, Wyoming on March 8, only two days off schedule, greeted by the townsfolk, yipping cowboys on terrified mounts, and a few bewildered Indians. Schuster took on another crewman: Hansen, the Norwegian from the DeDion. He had fought with St. Chaffray in Chicago, caught a train west, and was waiting for the Americans. That same day the Motobloc fell out of the race in Cedar Rapids. Only four cars were left.

Between Rawlins and Rock Springs, Wyoming there were no roads, and the Thomas rolled along the tracks of the Union Pacific. The railroad scheduled it as a special train. The flimsy tires kept blowing as they bumped across the ties, and once while making repairs, still sitting in the track, the crew had to set out flares up the line to stop the San Francisco express.

Speeding for the Rockies, the Thomas was 1,000 miles in front of the Zust and 1,300 ahead of the Protos. The Thomas and its half-frozen crew made it over the mountains through a howling, snow-filled pass 11,000 feet up, headed south across the Nevada desert into California, and hit Death Valley. Flanked by dazzling, ridged sand dunes, they started across the crusted bottom of the vast depression. The heat was atrocious, as thick as vapor; there was no shelter anywhere and the underside of the car was a furnace, but they finally gained the far mountain wall, rolled through sage and bleached grass into green country, and raced up the coast.

The Thomas reached San Francisco on March 24. It had covered 3,800 miles in 41 days, the first car to cross the continent in winter. The city celebrated the American car's overwhelming lead despite Schuster's quiet protest that the race was far from over. There was no word of the Protos, which at last reckoning was three weeks behind.

The Zust continued its slapstick and hair-raising mishaps. Once the front wheels hung over a 200-foot abyss on a road almost carried away by a landslide. Later it fell through the ice when a bridge collapsed, and punctured a gas tank. Scarfoglio took it across the mountains, but was towed into Ogden, Utah with differential trouble and a cracked chassis, in the midst of a cortege of weeping Italians. The Zust didn't leave Ogden until March 21, and limped into San Francisco on April 4. The DeDion came in a day later. One of the French crew had gone blind in the desert and was replaced.

On March 27 the Thomas sailed for Seattle en route to Alaska. It reached Valdez, Alaska on April 9—the first car seen there. The next leg was cross-country north to Nome, where the Thomas was to be shipped across the Bering Strait. Schuster made a reconnaissance by dogsled and realized the wild land was impassable. The snow was chest-high and massive drifts were softening fast. A car would not only be stopped, he thought, it would vanish. Conditions were similar on the Siberian side of the strait. The spring thaw that year was one of the earliest in history, after one of the coldest winters on record. The Thomas was loaded aboard the next steamer south for Seattle.

The route was again redrawn. The cars would start together across Asia from Vladivostok. They could reach that point from Seattle by whatever means and direction they chose. From there they would cross Manchuria, skirt Mongolia, enter central Siberia, and eventually hit the original route to Paris.

The Protos had thrown two rods near Ogden when Koeppen learned of the new route. He knew he'd never make up the time going overland, and now he had his excuse. He requested permission to ship by rail to Seattle. The committee refused, but Koeppen insisted he couldn't be disqualified if he entrained for the coast. With brazen gall, he rationalized that the committee had "failed to provide passable roads," didn't wait for a ruling, and skipped 1,000 miles of the worst country.

Schuster reached Seattle April 18 and was told that the Zust and DeDion had sailed to Japan four days before. The Protos had just arrived and Koeppen said he'd been disqualified, but was shipping his car direct to Vladivostok. Factory mechanics and a new engine would be waiting. He was going to stick it out—if only as a lowly observer.

Schuster wasn't fooled. He'd already sized up the German as a man crazy to win by any means. (In his very old age, he reminisced about Koeppen: "I never did trust that fellow, always strutting around like he just stepped out of a bandbox, and he smelled too pretty to be on the square.") Schuster was sure that the first car into Paris, whatever the circumstances, would reap the glory. At first he was going to stick close to Koeppen and ship to Vladivostok; then he decided to join the others in the first automobile crossing of Japan.

The committee meted out time penalties and bonuses. Koeppen's wily, constant intrigue paid off and he was allowed to reenter the race at Vladivostok, with a handicap of 15 days against the Protos. The Thomas was given a bonus of 15 days for its round-trip voyage to Alaska. In Seattle, another intrepid *Times* correspondent, George MacAdam, joined the Thomas. On May 17, 1908, after crossing Japan in two days, the Thomas regrouped with the other cars in Vladivostok.

The Thomas reached San Francisco on March 24. It had covered 3,800 miles in 41 days, the first car to cross the continent in winter.

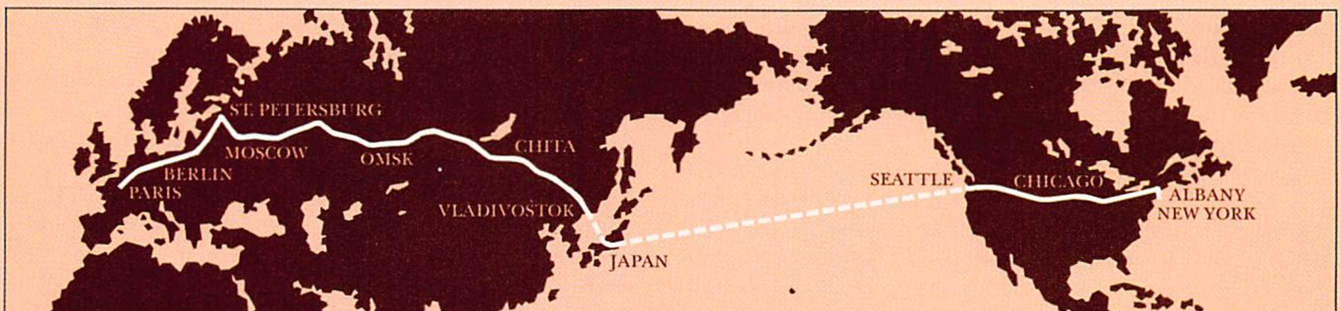
At this point the manufacturer of the DeDion, disgusted with the committee's incredible misjudgments and decisions, withdrew his car.

Schuster had welcomed the fresh start from Vladivostok, confident the Thomas could run its rivals into the ground. The German would have to reach Paris 29 days ahead of the Thomas Flyer to cancel out handicaps and bonuses. But it wasn't impossible; anything could happen in the Siberian wilderness.

Schuster scrounged 300 gallons of gasoline at $1.25 a gallon from Kuntz & Albers, an importer, and bought 100 more gallons from a pharmacy. It was barely enough to reach the first refueling depot. At dawn of May 22, Schuster was at the starting line—but Koeppen had slipped away two hours before. The Americans scrambled off in pursuit of the German car. The Zust met maddening delays and didn't get off until June 5. The Italians were out of the race, but Scarfoglio wanted to finish.

Climbing away from the coast, the Thomas ran into deep mud and one of the crew had to wade through the pasty stink to take soundings. They hit patches of waterlogged grass that looked solid but gave way, and the car sank to its axles in the slime. The crew had to lay planks ahead of the wheels for long stretches, hours of grinding work for the cold, exhausted men. First rain and then a dry wind made the terrain a dismal mess that allowed the car to sink, then held it in a gluey vise. Hansen said it was like a frozen storm at sea. It was a wasteland of mud with no standing water, and when the straining engine overheated, they had to dig holes in the slime and wait for water to collect, then slosh it over the radiator with cups.

In the morning they started in pursuit of Koeppen, scanning the distance for bandits as they drove along the rim of northern Mongolia. Schuster refused relief at the wheel, pressing the Flyer to its limit. Soon he was only a day behind the Protos and finally drew even. The German



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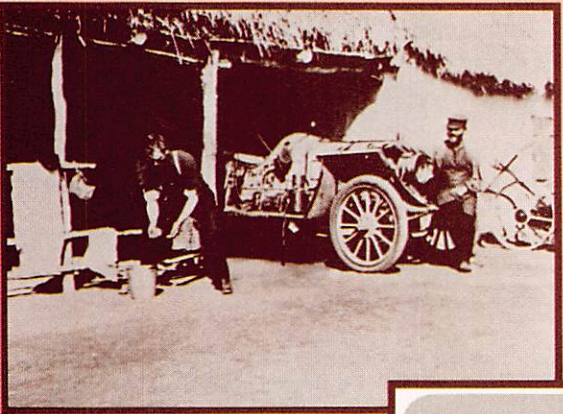

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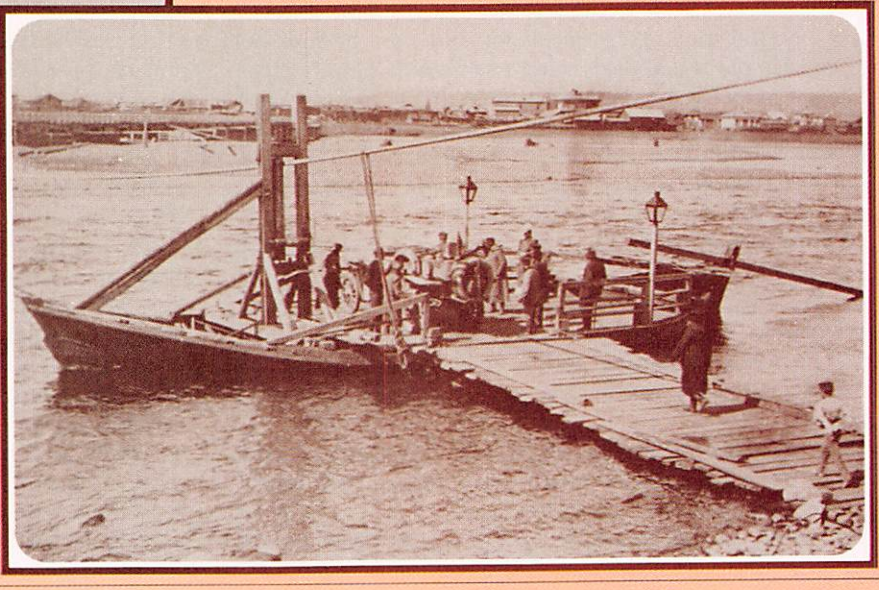

Miller scrubs up (top) *in a blacksmith shop outside Omsk. Curious peasants* (above) *surround the Thomas in Zyatzy. A primitive ferry system takes the Thomas across a tributary of the Volga* (right).

car was sunk to its hubs in a mud bog and Schuster, a true sportsman, stopped to help. No matter what Koeppen had done, his car was in trouble, and rules of the road demanded that the American offer aid. When the Protos was pulled out, Koeppen seemed to have a change of heart. He graciously thanked Schuster and broke out bottles of champagne. The two men debated whether to stick to the official route or use the roadbed of the Trans-Siberian Railroad. They agreed to stay on the planned route and shook hands on it. The Thomas Flyer left first as the Germans pretended to scrape the mud from their car. The moment it was out of sight, Koeppen headed straight for the railroad, and later won $1,000 for being first into Chita, a prosperous Siberian city.

Still in Manchuria, the Thomas lost five days after breaking down in a swamp with a bad wheel and transmission (damaged when they rescued the Protos). Hansen and Miller started on foot for a distant town, but collapsed after struggling a few hundred yards in the mud. They kept trying, lurching and stumbling, then rolled into the slime, trying to recoup their strength. Schuster thought everything was over when Hansen rose to his knees and pointed, trying to shout. Schuster saw a dark blur in the distance, heard a burst of sound, and was able to make out the shapes of horsemen beating across the swamp—a company of cossacks.

The officer barked an order and the riders tied ropes from the car to their saddle horns. Bursting into song, they spurred their mounts. Slowly, the Thomas oozed out of the mud and was towed to the town, the cossacks singing all the way. They cut the spattered ropes with sabers and left them lying in the road. The officer looked at the rusting, battered machine, laughed and shook his head, then the cavalry galloped off in a fusillade of shots.

Repairs were made, but after 70 miles the road became impossible, so the Thomas doubled back to pick up the track of the Trans-Siberian Railroad. In the Lesser Khingan Mountains, though the weather improved, the Thomas barely escaped a head-on collision with a mail train at the entrance of a tunnel.

After abandoning the railroad, the Thomas met constant rain, cold, mosquitoes, mud, and a track so overgrown the crew had to chop a way through. But in two days of nonstop driving they crossed into Siberia. Sixty miles across the border the rutted road ran through a flooded plain. Rivers had broken their banks, sweeping bridges away and swelling the fords. A black swamp stretched to the horizon. The Thomas kept sluing into ditches, hitting sunken rocks and logs that battered the vulnerable underside. A crewman in high boots, spelled every four hours, had to walk ahead and mark a path.

Schuster wondered where the Protos was. Even Koeppen, with all his tricks, couldn't make up much time in that kind of country. Soon they were attacked by thousands of gnats. They swathed themselves in netting and every shred of clothes they could find, but it was useless. Their only escape was to leap into the swamp and roll around, to suffer until the plague vanished with the darkness and the pinching cold. At last, the flood receded, leaving a resinous bed of mud. They were able to keep the car rolling, but Schuster prayed for dry ground. The car was rusting, being jolted to pieces, and everyone was in bad shape. Snatches of sleep did the men little good; they were used up, always tense, hungry, and thirsty. They froze by night and baked by day and their exposed skin was cracking. Eyes were red and painfully strained from the wind and glare and from staring into the distance. Miller and MacAdam had racking coughs.

The water rose again with new storms. It came within an inch of the magneto and carburetor, and the springs were submerged. The lights were of little use, continually doused by mud and water thrown up by the wheels. The

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photo: Judge Bentley Kassal

On July 30, 1908, the crew hoisted a muddied Stars and Stripes over the sagging Thomas. At Meaux, outside Paris, they were met by hundreds of honking autos and huge crowds shouting *"Vive le car Américain!"*

rain stopped and a wan, wasting moon tipped the stunted trees poking through the surface of the swamp. In another hour the water was too high to keep the engine running. Schuster dismounted the magneto and carburetor and kept them dry in the folds of his mackinaw. Soon the running boards and transmission were underwater.

It was too much for Hansen. He had imagined the race as a glorious sweep with sails across a flat, glittering, frozen tundra. He leaped off the car into deep water and looked up at Schuster:

"I've had enough. I leave you now. I leave New York-to-Paris. I leave all this damned foolishness!"

Schuster pointed into the darkness. "Where do you figure on going?"

Hansen shook his head slowly and climbed aboard. By morning the water was topping the big wheels and the front seats were going under. The crew thought they should split up and search for help. Then the level began to fall. In a few hours Schuster was able to start the engine, and they made good mileage before breaking down on June 14 near Shilka, a railroad town. He discovered that Koeppen had passed through a week before—using the railroad all the way across Manchuria. Schuster was still leading in terms of the penalties and bonuses and wanted to push on, but they needed rest. That night they slept on a lice-ridden billiard table and used cues to fend off the rats.

At Lake Baikal, Schuster caught the German car boarding a railroad ferry that was pulling out, stranding the Americans on shore for 12 hours. By June 23, Schuster had drawn to within 100 miles of his rival. Speeding into Tomsk a few days later, he saw the Protos crossing the Ob River on a one-car ferry. On the trip carrying the Thomas, the flimsy craft sank 10 yards off the far shore in shallow water. Hauled out by oxen, Schuster continued his breakneck pace, driving 20 hours out of the next 24, and caught the Protos near Kormilovka on June 29. July 1, fighting off Koeppen's challenge in a great neck-and-neck race, he reached Omsk, 3,408 miles from Vladivostok.

The Thomas's transmission broke again after a plunge into another bog 30 miles outside of Omsk. The damages were patched except for a stripped crankshaft bearing. The resourceful mechanic, George Miller, made a mold from clay, wood, and a piece of tin. He melted lead screws in a pail and poured the molten metal into the mold. After it cooled, he trimmed and smoothed the bearing and it fit perfectly. The Thomas reached Ekaterinburg, now called Sverdlovsk, on July 8, regaining the lead, but the repaired transmission collapsed soon after. Schuster and Hansen traveled more than 200 miles by horseback to Kazan to mend the broken parts. The Protos passed the crippled car and reached Kazan on July 15 as the lead seesawed.

Lagging by one day, the Thomas raced nonstop for eight days. Clinging to the rocketing car, no one could sleep as Schuster, who drove most of the time, kept pushing in a frantic effort to catch Koeppen. Nearing the end of their endurance, the crew could barely sit upright as the Thomas whirled into St. Petersburg on July 23. At that moment, Koeppen was nearing Berlin, almost 1,000 miles in the lead. Schuster was bitterly disappointed after his heroic effort, but he conceded that Koeppen was a great driver, crossing the 1,187 desolate miles from Ekaterinburg to Moscow nonstop in 42 hours.

During a celebration in Berlin, Koeppen heard that the Thomas had crossed the German border. He left immediately on the last leg to Paris, jettisoning anything that could cut his speed. He knew Schuster would be declared the winner, but believed that the first car across the finish line would capture the attention of the world. He arrived on July 27, at 6:15 p.m. That same day Schuster entered Berlin and was told the bad news.

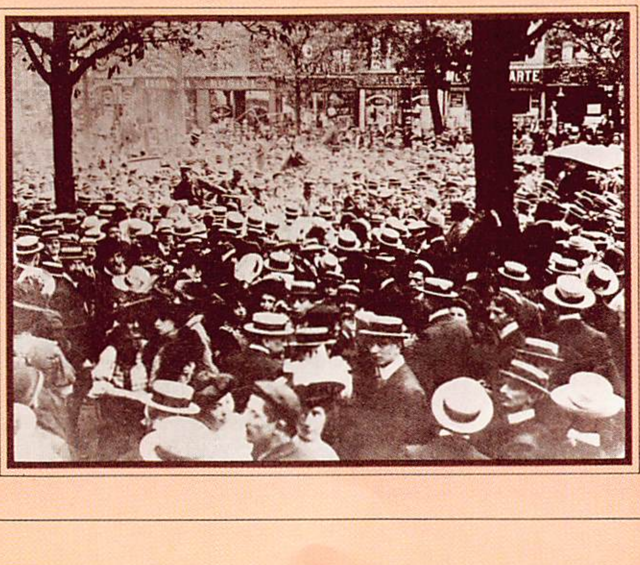
Koeppen's car sprinted down the Champs-Elysées on a soft summer evening. There were few motorcars in the street, and only a small crowd remained. Koeppen drove to the office of *Le Matin*, where he received a cool reception. He left for Germany the next day, and there received the victor's welcome denied him by the French.

On July 30, 1908, the crew hoisted a muddied Stars and Stripes over the sagging Thomas. At Meaux, outside Paris, they were met by hundreds of honking autos and huge crowds shouting *"Vive le car Américain!"* The convoy escorted them to Paris at 8 p.m. and the city poured out in tribute. In the Place de l'Opéra, Schuster was flagged down by a gendarme for driving without lights, and was allowed to continue the triumphal parade only when a cyclist stuck his bicycle with its lantern in the Flyer's front seat.

There were parades in New York, Buffalo, and Washington, D.C., where the crew was received by President Theodore Roosevelt. Souvenir hunters almost tore the Thomas apart, but it was restored and is still on exhibition at Harrah's automotive museum in Reno, Nevada.

Koeppen died in World War I, but his Protos can be seen in the Deutsches Museum in Munich. The bad luck of the Zust persisted. It managed to limp into Paris only on September 17.

George Schuster, the improbable hero, died in 1972 at the age of 99. For his victory, the Thomas Company raised him from $35 to $50 a week. After Thomas went out of business in 1912, he worked for Pierce Arrow cars as a representative in Asia and Africa. In the latter part of his life he was a Ford dealer. He gave up driving at 90, when his eyesight failed—just another very old man bewildered by the speed, tension, and complexity of modern traffic.



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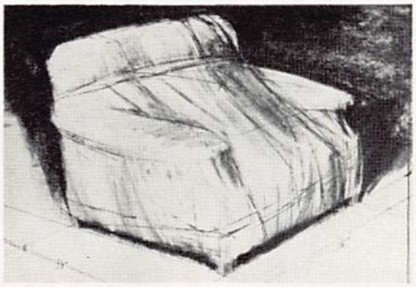
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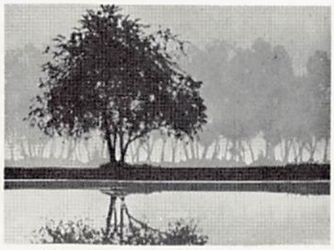
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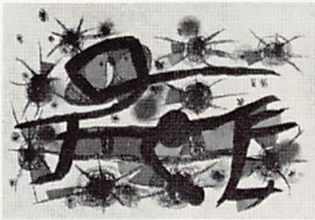
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BRINGING UP BOOMERANG

More is never enough

MAXINE KUMIN

Some of my writer friends traveled in Europe last summer. One holed up in Nantucket and completed a draft of a novel. Several bibulous and congenial types wandered from writers' conference to writers' conference earning emoluments and adulation. I spent three months in rural New Hampshire ministering to an orphan foal.

How does a human get so involved with horses that she can spend hours every day in their large and redolent company?

It goes like this. When I was a small child growing up in Philadelphia's then-fashionable suburb of Germantown, the garbage wagons were still drawn by horses. So were some of the milk wagons (yes, Virginia, milk was once hand-delivered daily, like the U.S. mail). One winter I gave away my three older brothers' camp blankets to various needy Dobbins of my acquaintance.

It wasn't as if there had been no animals in my life; on the contrary, we were a family that "had" dogs. A succession of them ran away or were struck by cars or were poisoned by phobic neighbors. It seemed we were always beginning again with a puppy, which was never allowed abovestairs and each night was incarcerated in the cavernous cellar. When the poor beast howled at night, I frequently snuck down into the gloom and curled up with it on the discarded shag rug allotted for its bed. It was toasty warm in the cellar and the rug was a thick one, but my deed was more heroic than it sounds. I was terrified of the dark, but even more terrified that turning on a light would alert my parents. In those days, sensible children reserved their most extreme fear for the wrath of the elders.

Cats were forbidden; my mother never trusted cats. They were known to leap into baby carriages and suck away the infant's breath. I confess I never developed anything deeper than respect for cats. They are good mousers who keep the barn free of vermin.

Horses, surprisingly, *were* considered respectable creatures. I was permitted to take weekly riding lessons at a nearby livery stable, but punished for staying late to groom and feed and shovel manure. In truth, as the youngest of four children I felt an empathy with the animal world that was not manifest in the human one. I was wanted. I was doing a job. Moreover, manure mixed with wood shavings smelled better to me than perfume. At the risk of coprophilia, I confess it still does.

Shall we now take into account Sigmund Freud and the Horse as Phallus? The young girl's interest in horses, according to the Master, is the socially acceptable sublimation of her sex drive. Horses symbolize dominance. Girls love the feeling of being in control of, and astride, all that power. When boys come cantering into the normal girl's life, horses back out of it. By implication, those females who experience no diminution of interest in horses after the onset of puberty are locked in internal struggle, ripe for neuroses, and will in time provide a rich pasture for the expensive romp of the psychoanalyst.

I deny nothing. I attend all hypotheses *qua* hypotheses. Freud's theories of female sexuality have now been substantially discredited, if not debunked. But the pathology of my own case is clearly linked to those dark-green, all-wool camp blankets with their embroidered S for Camp Shoshonee that rode down Carpenter Lane one by one on the bony rumps of the garbage collectors' jades. All my childhood I was a closet "Keeper of the Beasts." It seems I am still collecting and blanketing—rugging, it's called—the castoffs.

The story of Boomerang, my orphan foal, begins with such a rescue mission. Two years ago, for the price she was to fetch from the slaughterer, I bought a sad-eyed, gravely undernourished mare. Taboo was a topography of saddle sores. Her tongue had been torn nearly in two with a wire bit. Her vertebrae and hipbones were vividly enough defined to provide an anatomy lesson for a zoology class. Her owner, operating on the theory that the less you feed a spirited horse the slower it will go, had been starving her, to no avail; she had run off with her last three riders.

MAXINE KUMIN is the author most recently of *The Designated Heir*, a novel, and *House, Bridge, Fountain, Gate*, a collection of poetry. *Up Country*, another collection, won the Pulitzer Prize in 1973.

Boomerang comes when called, and answers with a whinny. She greets me at feeding time with a basso little nicker.

Taboo was gradually restored to normal horse silhouette. I exercised her on the longe line at first; the horse describes a circle around the trainer and learns to walk, trot, and canter on voice command. Then I rode her, timorously, while a friend worked the longe line. Finally, unattached, I began to walk and trot her in the ring. She was wonderfully smooth and responsive.

That spring, when I went trail-riding for the first time with a friend, Taboo clamped down on the bit and ran away with me for two miles. We raced her mythological wolves at a flat-out gallop down a hard-packed dirt road at high noon. The wind rushed in my mouth and took away my breath. Dying will be like this, I thought. Dying will happen around the next bend. Luckily, I met no one coming the other way, although I remember glimpsing a very surprised fisherman as we clattered over a wooden bridge and flew inexorably onward.

Having survived that 40-mile-an-hour ordeal, I learned to ride alone, and to canter only on the steepest hills so I could somewhat control this schizophrenic mare.

Why don't you breed her? my horse friends all suggested as the season turned. Mares have a way of settling down after they're bred. You'll see how calm and docile she'll be after she's had a foal.

Taboo came unmistakably and definitively into heat on June 30. She squealed and squirted urine and rubbed her tail on the barn side until the top hairs fell out. Awaj, the local Arabian stallion, serviced her on each of four successive mornings. Forty-nine days later, she caught me in an inattentive moment and ran away with me again. Once I had her in hand, I walked home, shaken. It was no use. She would have to go to the knacker. Death and dog food awaited this beautiful crazy horse. Then, just like a television soap, the vet called with news of the blood test. Taboo had "settled"; Awaj had gotten her pregnant.

And she did settle down as the pregnancy progressed. During the last two months of that 11-month-long gestation, I rode her bareback so as to spare her the discomfort of the girth around her swollen barrel. It was blackfly time; I wore a beekeeper's hat to defend against them. She wore her gauze ear-bonnet, which ties under the throat, for the same purpose. Since she was shoeless, I put on the winter Easyboots, weird but effective contraptions of polyurethane that are custom-designed for each hoof. Even so, they have a way of coming loose in snow, and since they are notoriously hard to locate, white on white, I had painted them red. Thus sallied forth the eccentric woman who lives over Joppa way and her strangely gotten-up horse with its red toenails!

On the night of June 2, Taboo foaled. The little buckskin filly was on her feet whinnying in a moment. And then the nightmare began. The mare, snorting with panic in a far corner of the stall, would not allow the newborn to approach her. Each time it nosed blindly against her flanks, hungry to suck, she bit and kicked it.

A frantic call to the vet at 1 a.m. Never had I felt guiltier, not even when I awakened the pediatrician for advice about earache. Twitch the mare and back her into a corner every two hours, was the vet's advice. If the foal doesn't get the colostrum—the first milk secreted by the mammary glands immediately after birth—it won't get the antibodies necessary for its survival. A twitch, for the uninitiate, is a metal pincers used to restrain a horse by tightening it around the animal's upper lip. Even subdued with a twitch and with her hindquarters backed into a corner of the stall where she could do the least damage kicking, Taboo was a terror. The pathetic little battered foal went on fighting for her birthright, getting 10 or 12 hungry sucks at a time.

We went through this medieval torture every two hours around the clock for the first day, every four hours thereafter. On the morning of the third day we separated the two forever. Taboo the unwilling mother, turned out to pasture, recovered rapidly. Boomerang the foal, imprinted from the first on the intervening humans who had saved her life, regards people still as her mother-surrogates. We bottle-fed her for about four days and then were able to wean her to a pail. This is easier than it sounds; horses drink by sucking rather than lapping. The amazing thing was how rapidly 32 ounces of formula went down. Because Boomerang's forelegs were too long and her neck too short to drink from a pail set on the ground—after all, nature had designed her to suckle standing up—we built a little stand on pegs to hold the bowl of milk. A few weeks later, we did the same with a grain box.

It was hard not to hate the rejecting mare. It was even harder to put up with the jocularity about women's lib that she and I were subject to. For half the town turned out to ogle at the miracle of the orphan foal who had not only survived her ordeal but showed every sign of growing up to be a well-made pedigreed filly. I developed a certain paranoia. How many minutes into the conversation would it take for each man who sauntered up the hill to say something terribly clever and snide about the role of the female?

Nodding his head at the mare grazing in an adjoining pasture, my farrier said, "Guess she's been readin' *Ms* magazine" (one minute).

The vet, an affable, unflappable man, bending over to stitch the foal's worst cut, offered, "You shouldn't've given her all those books on bein' modern" (two minutes 30 seconds).

"That's a damn smart mare," the man who raises vealers said. "Why'n't you get her some trousers and she can go to the city?" (20 seconds).

I remembered the look of terror in the mare's eyes, how she quivered and trembled when the foal struggled out of the amniotic sac, rocked and swayed finding its balance, and staggered toward her. She seemed to say, "What happened? I had a little cramp and lay down for a minute and when I got up there was a ghost in the stall!"

I remembered my own terror in childbirth-before-the-Enlightenment: how alien that screaming bundle of raw flesh seemed, wrapped in white cloth and presented to my awkward arms!

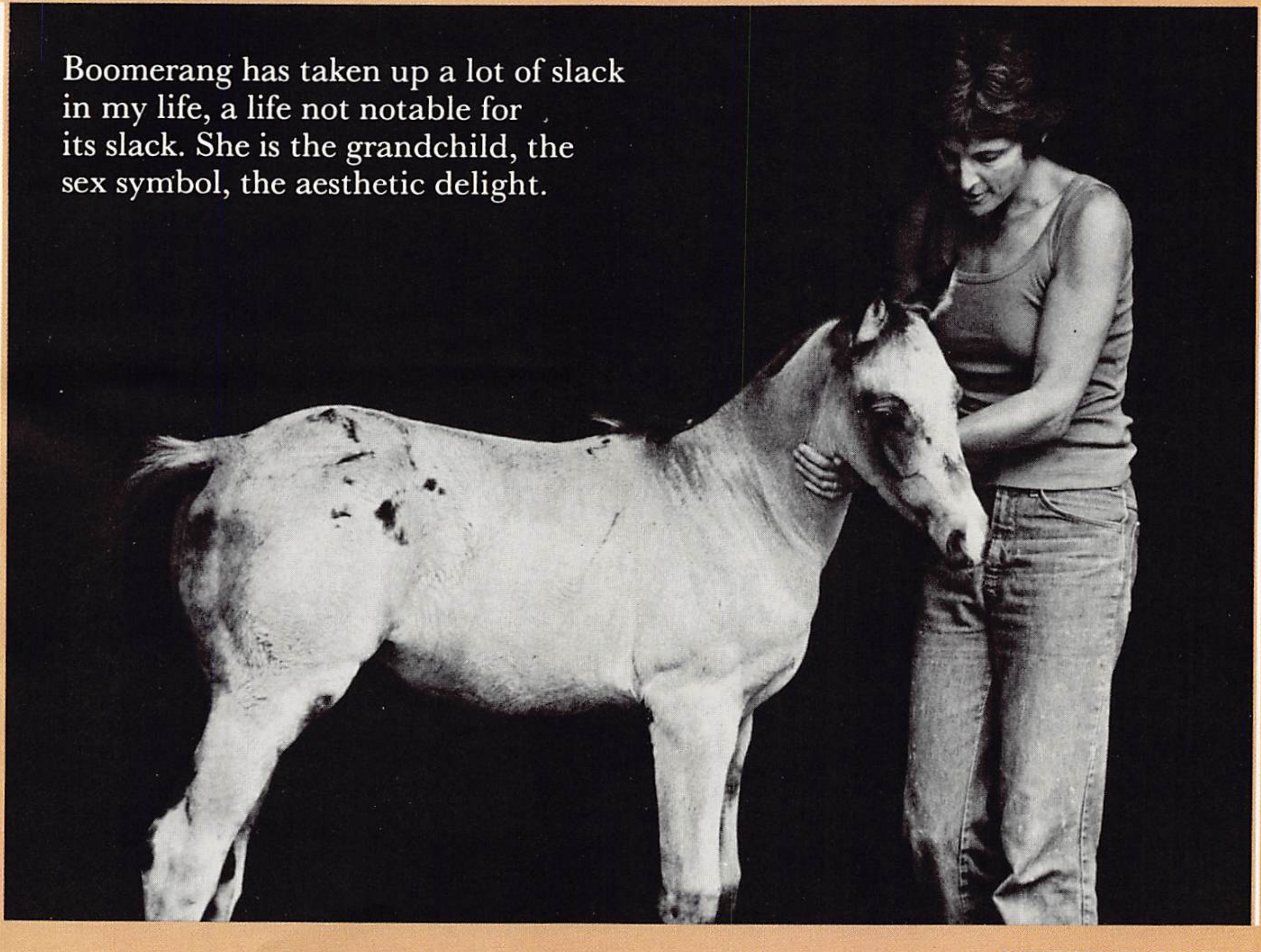
I remembered how excruciating the nursing process had been. My nipples cracked and bled afresh with every session. After five days of agony every four hours, I capitulated. The hungry baby made a happy transition to bottled formula. I came down with what was then called "milk fever" and suffered the conclusion that I was not made for suckling my young. That deprived infant and the two who followed were raised on cow's milk and Karo syrup diluted with water and boiled to a fare-thee-well.

And I remembered the hiss of discomfort, that sharp intake of breath on the mare's part every time the foal nuzzled its way to her milk bag. When the little one finally clamped onto a teat, the mare was almost unrestrainable. Pain, I thought, unmitigated by maternal instinct or social pressure. Sigmund, where are you now when I need you? I was relating all over the place.

It is not unflattering to be followed about by a foal. The general public does not realize that you represent MILK. The general public cherishes a fantasy of loyalty, love, and little-lamb enduring values. That filly would have left me in an instant for a welcoming mare with milk in her bag. As it was, she had to make do with Borden's Foal-lac, a milk replacer supplemented with every known vitamin and trace mineral and almost as expensive, ounce for ounce, as good Scotch whiskey. The 25-pound cans (at $33 a can) come impishly illustrated with a photograph of a cow wearing a saddle and bridle, an anomaly I came to loathe at two in the morning as I mashed and stirred the lumpy formula into a potable gruel. Since our other horses are turned out all night in summer, at least I did not have to contend with a barnful of inquisitive geldings when I went down with the copper bowl from an old chafing dish which exactly fitted the stand we had built.

May it be said in Borden's favor that they also manufacture Foal-lac in pellet form. By the end of the first month, Boomer had acquired four teeth and a certain hazy notion of the texture of solids. She spilled as many as she chewed, but came to love a mixture of regular grain and the magic expensive pellets. We kept her on her early morning "fix" of warm formula, however, long after the other milk feedings had been gradually and sneakily withdrawn. The first morning I arrived in her stall with pellets and grain only, she knocked me flat in her 10-week-old zeal to discover where the hot milk was hiding.

Even so, in a way it was less traumatic than the normal weaning. All too often, mare and foal shriek piteously to



Boomerang has taken up a lot of slack in my life, a life not notable for its slack. She is the grandchild, the sex symbol, the aesthetic delight.

PHOTOGRAPHS BY GEORGIA LITWACK

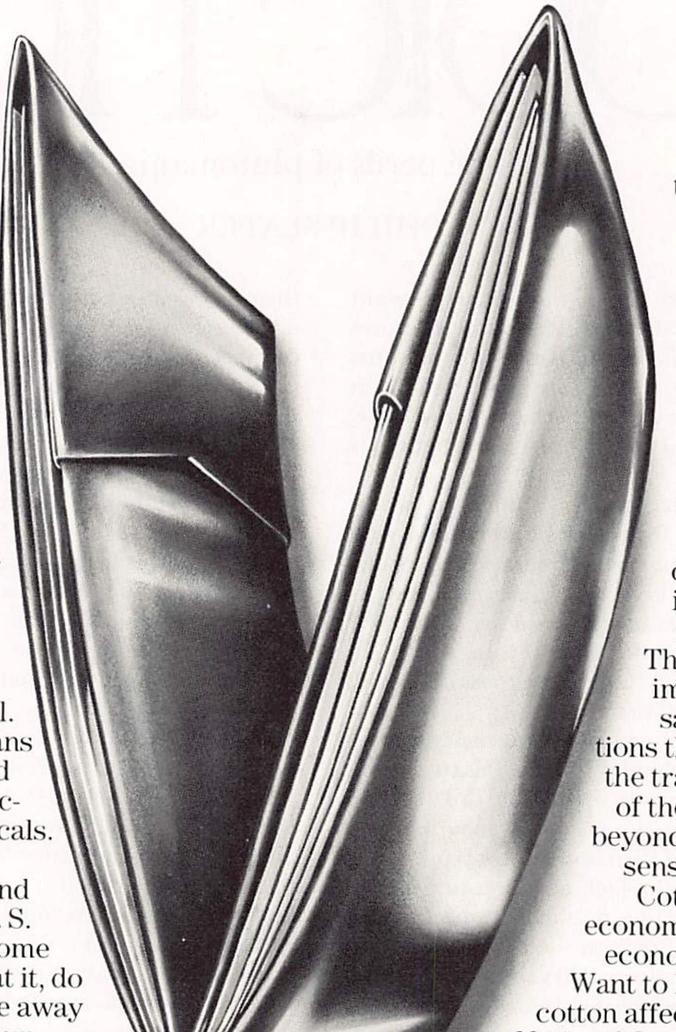
each other for days after separation. And then, just when your sanity has eroded to the hardpan madness that lurks beneath us all, they lose interest in each other. Two weeks after that, they have forgotten the maternal-filial relationship altogether. They are, miraculously, strangers and may now become friends. . . . Not without its appeal, that notion, to us mothers for life.

What a mare teaches her foal are the normal precautionary measures even a domestic beast must take: flee the unusual sound or movement; be wary of strangers; come when called, and above all, emulate me. On the first day of Boomer's life a septic tank was being installed, an operation that involved a backhoe and a bulldozer not 50 feet from her stall. Carpentry, meanwhile, was proceeding overhead to the tune of an air compressor that seats the started nails and stutters like a machine gun. With that for normal background noise, there is little indeed that spooks this filly. As for caution regarding strangers, people in her orphan brain are safe and warm and food-providing. Thus she has accepted the halter and lead shank almost without question. She stands to have her feet lifted one by one and tapped on in preparation for the age when she will be shod. Come when called, yes, and answer with a whinny. She greets me at feeding time with a basso little nicker. As for emulation, the situation is fuzzy. Instinct has prevailed; she has learned to graze. She bucks and rears and races for the hell of it, dodging about as nimbly as a goat, and when she runs at her happiest, she carries her tail straight up, like a deer's scut.

Today, Boomerang is five months old and growing fast. The trees are leafless now. There is a cutting edge to the north wind. Nature has responded by providing her with a fuzzy winter coat, far thicker than the coats adult horses develop each autumn. I've just spent an hour repairing a stretch of fence that had yielded to some large-scale leanings and scratchings. As I head back down the pasture toward the barn, Boomer whinnies shrilly. She is torn between staying in the field with the other horses and following me to the paddock. I don't turn back. She hesitates, then, just before I drop out of her line of vision, comes racing after me. I stay for a few minutes in the paddock, tousling her much as you might tousle a large dog. She nuzzles and nudges me for more. As with an affectionate dog, more is never enough. After I duck through the fence and head toward the house, she stands for a few minutes at the rail to make sure I mean it. Finally, she trots back out to the upper field, rejoining the geldings and the mare.

She has taken up a lot of slack in my life, that one. Between teaching commitments and my own writing, to say nothing of the daily exigencies of a country life in which we grow our own vegetables and cut our own wood, it is a life not noted for slack to begin with. But living in and with the world of the physical is a release from the world of the mind. Paradoxically, I find mucking out stalls each morning a fine and private time for thinking. The poet in me is fed. I am deeply nurtured, I think, by the animals I deal with and observe, from the chipmunk that lurks under Boomer's feedbox or the fox that enters the paddock at night to sit and bark, to the horses themselves, those immense presences. "Animals are honest through their inability to lie," I said in a poem. Their instinctual responses, their lack of guile, their physical grace, and their intellectual limitations all move and work in me.

And of all animals, surely a foal is the chief aesthetic delight. Sometimes, leaving Taboo out of it, I think how much I'd like another one. Anybody out there with a proven brood mare in need of a kind home? ●



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WEALTH ADDICTION

The perils of plutomania

PHILIP SLATER

In the California city where I live there is a pleasant neighborhood called Pasatiempo. The name conjures up images of dreamy Mexican villages with peasants sleeping the noon away, but there are no peasants in Pasatiempo. High above the city on a charming hillside, gathered comfortably around a golf course, Pasatiempo is where rich folks live.

The Bicentennial year in my city brought a severe drought. There was a call for water conservation and ultimately restrictions on water use were imposed. Public response was gratifying: even before the emergency restrictions were enacted, city water usage was down almost 20 percent in response to requests for care in using water. In the entire city, only Pasatiempo failed to respond. Instead, it *increased* consumption by 50 percent.

This little event contained what were to me two mysteries. The first was the behavior of the Pasatiempans themselves: What drove them to engage in this feverish consumption? It was as if at the very first mention of a shortage they all ran out and turned their hoses on.

The second mystery was the lack of any outcry when word of this piggishness became public. We might have expected that such a severe break in the ranks would sap the desire of other residents to conserve water. Instead, water conservation was so successful that all restrictions were removed months before any major rain was due. It almost seemed as if people *expected* the rich to take more than their share. The poor suddenly appeared to me like tolerant parents of a greedy child—wisely recognizing his inability to control his impulses at such an early age.

As I thought about this, I began to feel that all our contradictory ideas about wealth were missing something important. The capitalist view, for example—still widely accepted among the general public—is that wealth is Nature's reward for special cleverness, industry, or talent. Rich men are assumed to have some kind of ability or competence, even when their wealth was chiefly inherited. I think people want to believe that money can purchase anything, even an aptitude and a personality.

The Marxist view sees wealth largely in social terms. Unlike capitalist ideology, it stresses the corrupting influence of money and its related institutions, but it pays little attention to the fact that some people are more susceptible to this infection than others. The Marxist theory of wealth addiction is a lot like the American theory of drug addiction, which assumes that if the evil pusher can just manage to sneak a little heroin into his unsuspecting victim he can count on adding a lifelong addict to his string of customers.

The early days of psychoanalysis saw some promising beginnings toward a more sophisticated psychology of money. Freud and his disciples talked about the preoccupation with money displayed by the "anal personality," who was always hoarding, and accumulating, and tidying things up. But this interest in the neurotic side of wealth began to wane as the psychoanalysts themselves became wealthy, and in recent decades analysts have tended to concentrate more attention on the anality of poverty and *un*tidiness.

Money, like heroin or cigarettes, is certainly an addiction, and one to which few of us are altogether immune. A recent man-in-the-street interview asked the passersby if they resented people with great wealth. All of them answered in the negative, arguing either that the wealthy had earned their wealth or that it was stupid to be resentful of a group one hoped one day to enter.

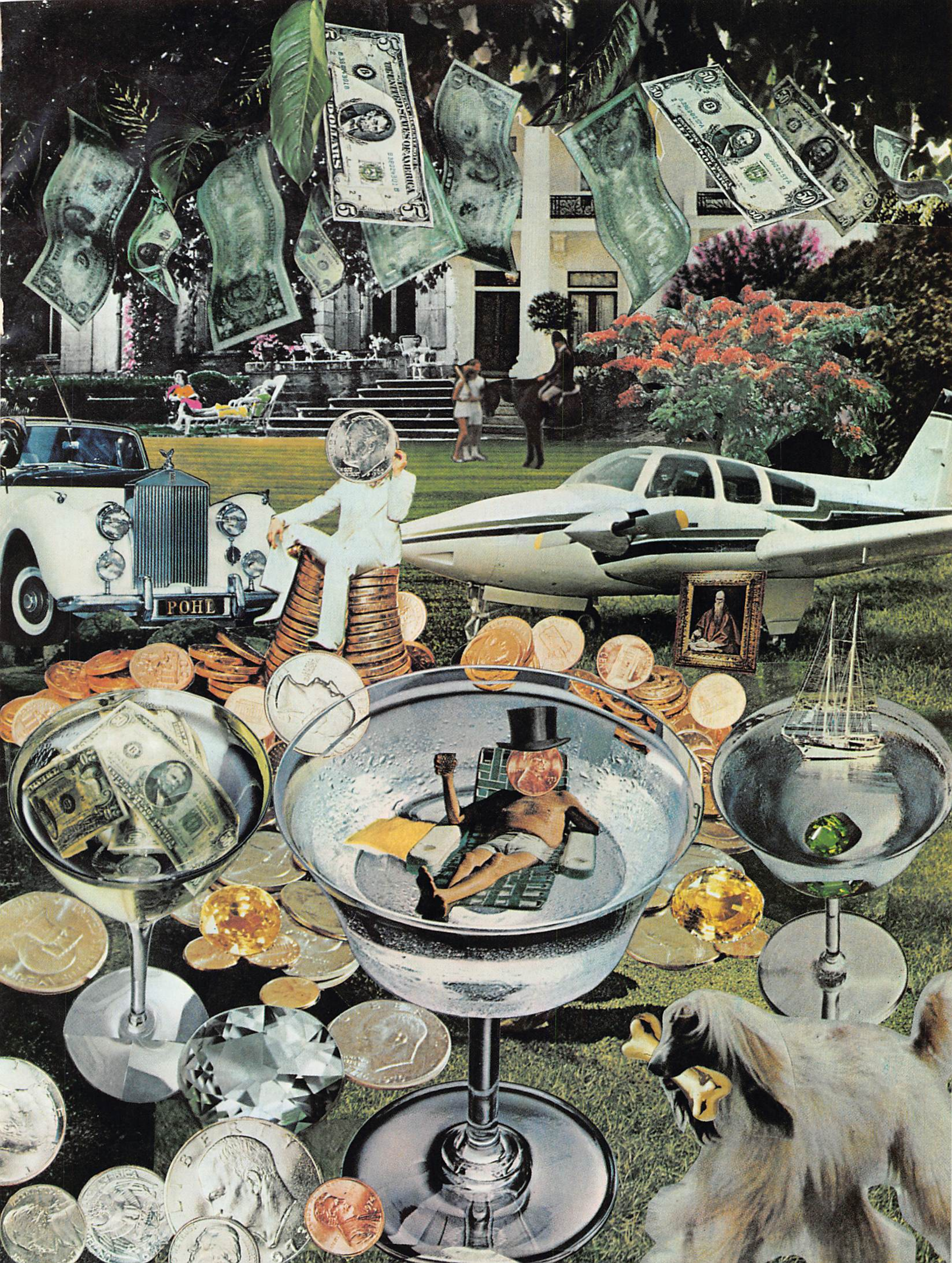
The sociologist C. Wright Mills showed long ago that great wealth is not earned but acquired. The extremely wealthy, in most cases, inherit a comfortable fortune and use their power, inside knowledge, time, and energy to multiply it into a grotesque one. As to the newly wealthy, it isn't easy to make a case for their being any more deserving: it's extremely rare to find a large fortune that isn't founded on illegal, or at least unethical, practices.

In my view, most rich people are simply more needy, more insecure, more grasping than other people. Money is their narcotic: they *have* to take more than their share, for what they have isn't satisfying if others have it, too. Taking is only gratifying if it involves taking *away* from others.

This seems to me the only way we can make sense out of the fact that wealthy people so often hoard or overconsume during a shortage. When things are scarce (as in World War II), many rich people not only take more than their share, which they do at all times, but also take *more than usual.* In the energy crisis of 1973-74, for example, wealthy people purchased large, expensive, fuel-devouring cars by the thousands, apparently to show that they could afford it. This behavior reflects more than just the greed that made these people wealthy in the first place, or the stinginess that preserves that wealth—more than J. Paul Getty having a pay phone installed in his own home,

PHILIP SLATER is now writing a musical comedy about the life of Snow White and Prince Charming. His previous books include *The Pursuit of Loneliness*, *Earthwalk*, and, most recently, *The Wayward Gate.*

ILLUSTRATED BY DENNIS POHL


POHL

or Hetty Green stuffing her clothes with newspapers to keep warm while making a million dollars on the stock market. It reflects the fact that things have value for wealth addicts only in proportion to how much *other* people want or need them. In other words, *taking more than your share is what wealth addiction is all about.*

In my city there is a yacht harbor with hundreds and hundreds of expensive boats. On the finest day of the year far less than a quarter are in use, and for most of the year all but a handful sit idle, to be used once a month or even once a year. They sit in the marina, behind the locked fence, as symbols to be envied. They exist, in other words, to frustrate wealth addiction in others. If so, then *wealth is the only form of addiction in which the addict gets high by foiling other people's addiction.*

Many people dream of having their own boats, and more do become owners every day, despite the fact that as an investment owning a boat ranks a little below playing the slot machines. To own and moor a boat in a populated area costs so much that one would have to use it at least three times a week every week of the year to make it cheaper than renting one by the day. If all the boats were made accessible for rental to the public, there would be enough boats for people in the area to sail by the day as often as they wanted or were able to. It looks as though one major function of owning a boat is to prevent other people from enjoying it.

Boats are only one of many examples. An airport housing private planes finds even fewer in use at a given time. And think of vacation houses: in my city the choicest shorefront homes with the most magnificent views sit empty most of the year with shades drawn over their picture windows. They seem to exist, not to take pleasure from, but to prevent poorer people from enjoying the beauty they command.

Poor and middle-income people seem to tolerate being ripped off by the wealthy—either because they sense the neurotic needs of the rich and feel indulgent, or because they entertain the fantasy of becoming rich themselves. This fantasy betrays the closet addict, whose secret dream brings him into unwitting collusion with the wealthy. But it's a conspiracy from which the closet addict gains nothing and the wealth addict gains everything.

It's the closet addict who maintains our double standard of justice. With all their power and ability to bribe officials, the wealthy could not flout the law as consistently and successfully as they do if there were a strong mass sentiment in favor of equal justice. Without the covert support of closet addicts, the bribes would be exposed, the suspended sentences would cause public wrath. As a nation we still cling to the idea that only the poor can commit crimes—stealing *from* the poor is treated by many judges as a misdemeanor. In my city, for example, a wealthy doctor convicted of a massive Medicaid swindle was given a suspended sentence and ordered instead to give medical aid to poor Indians for a year—at a salary of $30,000! By such judges, and by the general public, the wealthy are not viewed as "criminal types." But only a relatively rich man can afford to hire a professional killer, and only a millionaire can afford a stolen masterpiece. The closet addict, however, has lost the capacity to feel indignation toward those who take more than their share of things. He prefers his secret fantasy to the possibility of a better, more equitable world. He is deaf to injustice, blind to inequality, and numb to exploitation.

The idea that everybody wants money is propaganda circulated by wealth addicts to make themselves feel better about their addiction.

Injustices can't be corrected without resentment. We don't have to hate wealth addicts, but we need to resent their addiction and the misery it creates for all of us—our economic instability, our miserable environment, poverty, and so on. To say "We are all victims of evil institutions" or "We are all addicts" is both emotionally paralyzing and intellectually irrelevant. The point isn't whether we're all addicts or not. The point is which *side* we're on: Are we for the addiction or against it? To admire or indulge a Howard Hughes is not only to acknowledge the addict within you but also to enter into collusion with him. Admiration of the wealth addict is a secret commitment to shoot up the first time an opportunity presents itself.

I use the word "plutomania" ("a morbid craving for wealth") to describe the psychological condition of rich people. Some may object to the language, feeling that not all wealthy people are addicts. But quantity is of crucial importance in all addictions—we use it regularly to tell the addict from the nonaddict. We don't call a man who takes heroin once or twice a year an addict, nor do we call a woman who drinks once a week an alcoholic. We're slowly beginning to acknowlege, however, that anyone who consumes five or six ounces of alcohol daily *is* an alcoholic, no matter what he or she imagines to be the case. By the same token, we can reasonably (and rather conservatively, I think) maintain that anyone with assets of more than a million dollars or a net income of over $50,000 a year after taxes is a wealth addict, whatever his own fantasies about it may be.

This is not to say, of course, that such people are the *only* addicts. Millions of poorer people are potential plutomaniacs; many potential alcoholics have never taken a drink. But it's a mistake to view all poor people as closet plutomaniacs, just as it's a mistake to view all nondrinkers as potential addicts. Many people are genuinely indifferent to money; many are indifferent to alcohol or heroin. Some have tried it and disliked it, others make daily decisions that express their disinterest. *The idea that everybody wants money is propaganda circulated by wealth addicts to make themselves feel better about their addiction.*

Other addicts do the same thing. Alcoholics surround themselves with heavy drinkers and imagine that drunks are the only people who ever have any fun, since they're the only people they ever *see* having fun. Plutomaniacs have an even easier time of it, since they exercise a lot of influence in our society and have been able, through the media, to inculcate addictive responses even in small children. Despite this fact, more and more people in our society are kicking the habit: "dropping out" is so common now that it has graduated from the dull glare of media interest to the anonymity of population statistics.

The usual objections will be offered: that some people are just born with money, or keep it out of habit, or have limited financial goals, or are just getting paid well for what they do, or just need security, and so on. The same kinds of arguments are used by alcoholics: they come from a hard-drinking family; they only drink socially, or when they need a lift, or because having cocktails is just a pleasant habit. "Just a habit" is a particularly odd excuse, since having a "habit" is what we're talking about. The point is that quantity and consistency are irrefutable symptoms of addiction—a person who is not addicted is able *painlessly* to do with less, and at times do without. The wealth addict, whatever his or her rationalization, maintains a high income or increases it. A nonaddict might stumble into wealth from time to time but would not cling to it, or seek more.

A more serious argument is that wealth (like alcohol, tobacco, or heroin) just makes people happy and should not be considered necessarily addictive, even in large quantities. There are certainly people who have had great wealth, enjoyed it, and lost it. But I don't know of anyone who has had it, *clung to it*, and not eventually become addicted and unhappy.

The secret strategy of all addicts is to represent their addiction as a benign human frailty to which everyone is more or less subject. To the tobacco addict, everyone smokes except a few health nuts; to the alcoholic, everyone drinks except a few dull puritans. The Don Juan who uses sex compulsively to bolster his sagging ego tries to pass himself off as unusually virile or lusty; and the plutomaniac argues that everyone is after money except a few deranged derelicts—that he is merely more skilled at getting it.

What distinguishes the wealth addict from the other three is that he has been largely successful in selling this self-serving delusion to the general public. Tobacco addicts and alcoholics are fighting a rearguard action against a public that increasingly recognizes them for what they are, and both men and women are getting better and better at telling the difference between genuine eroticism and a desperate ego. But wealth addicts have the propaganda machinery of the entire society working full-time to perpetuate their self-deceptions. The neurotic defense mechanisms of the most extreme plutomaniacs have become the official ideology of our society.

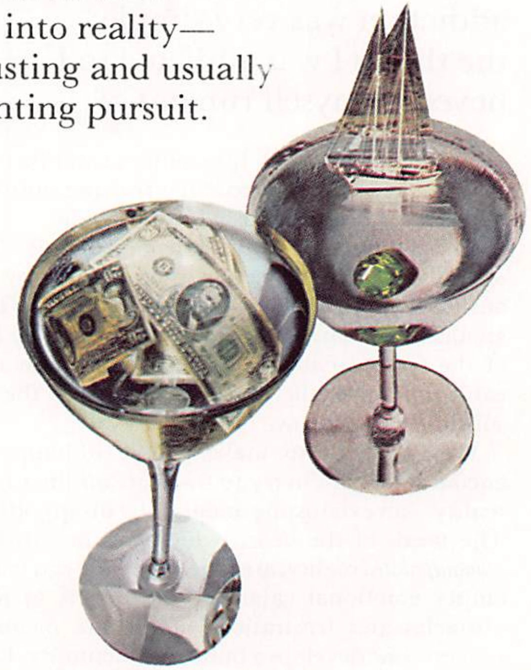
This is where the poor come in. Faced with the official ideology, the poor are given the option of accepting their poverty or becoming addicts—not a very happy choice. The ideology of the rich, in other words, says that the only way out of poverty and misery is to *buy* yourself out. *The poor are thereby forced to become closet addicts, since they are provided with no other way to define their problem.* Living under conditions that cause misery and suffering, they see money as the only escape. This is because our economic system is set up in such a way as to make no distinction between working to survive and working to support a money habit. The best things in life may be free, but they can be taken from you by people with wealth and power. In nature there is food, beauty, fresh air, sensual pleasures of all kinds, satisfying work, and so on, but many of these things have been made artificially scarce by wealth addicts, until they have become available largely to the rich or to the deliberately poor (ex-addicts who are mostly middle-class and know how to circumvent the addictive machinery of the culture).

No one who is hungry, cold, sick, and lives in ugly and miserable surroundings is in a position to learn that money is an addiction. You might just as well lecture a desert island castaway about neurotic "joiners" who can't stand to be alone: if you ask his opinion, he'll tell you that being with people is a very nice thing and no one should put it down. It's through this device—the forced poverty of the masses—that plutomaniacs are able to acquire popular support. *Deprivation makes fellow travelers and coconspirators of many who are not addicts by nature.*

To put it simply: although money can't buy happiness, wealth addicts have created a society in which the lack of it can purchase pain. This tends to confuse people into thinking that it *can* buy happiness, since it buys freedom from certain kinds of pain. The obvious solution is to equalize wealth to the point where this confusion is eliminated, and people can seek pleasure addictively or nonaddictively as they please. I don't mind junkies so long as they don't rip me off to support their habit. And I don't mind plutomaniacs so long as their wealth doesn't deprive others of the necessities of life, which at present it does.

It seems to me that any society worth talking about

Wealth tends to make people unhappy because it encourages them to try to translate all their fantasies into reality—an exhausting and usually disappointing pursuit.



should be able to ensure that *all* its participants have the bare necessities of life and the possibility of decent surroundings. A society that fails to do this isn't worth much, since some of the most primitive "savage" tribes manage it without even working hard. Our society fails only because it has taken on itself, as its primary social program, the task of fostering, encouraging, and supporting plutomaniacs at the expense of everyone else.

I know of no way to prove that one person is happier or unhappier than another. I'm sure most people could think of some rich person somewhere who seemed happier than the general run of humans. There are certainly alcoholics who seem cheerful, too, as well as merry smokers and serene-looking junkies. But it's one thing to say that some people seem buoyant even in the throes of an addiction, and quite another to say that the addiction itself makes them happy. I know lots of happy drunks, but I know of no one who has devoted a long life to alcohol and hasn't eventually been brought down by it, and I believe the same to be true of wealth. One has only to look at Howard Hughes or J. Paul Getty—two of the most conspicuous robber barons of our era—to see what wealth addiction can do. Hughes, for example, started as a very presentable young playboy with the world at his disposal, and ended as a starving, paranoid recluse trapped in a room watching old movies. Nor is this uncommon among the very rich: wealthy, paranoid, depressed recluses are a dime a dozen—Hughes was simply more theatrical about it, a result, perhaps, of his years in Hollywood.

This is no accident. The rich attract other addicts and very quickly come to feel that no one cares for them—only for their money. This may or may not be true, but it's likely to be at least partly true. The dilemma of the wealth addict comes from the fact that because of his wealth, genuine love or affection is in very short supply and he therefore needs very badly to control or coerce it. The more he does, however, the less he can trust what he gets. Money can be trusted, of course, but it doesn't satisfy the need. The more money the less trust, the less trust the more money, and so on, ad infinitum. Even his children can't be trusted, for if they are at all like the parent—trusting only in money—they are waiting anxiously for him to die.

The way I learned to detect each addiction was very simple: the things I was addicted to I never let myself run out of.

The children themselves are no better off—the children of wealth addicts are vicious and/or unhappy with notorious frequency. They are born addicted, like the infant of an alcoholic mother, and although they may be conscious of the fact that they want love more than money, they can't relinquish the money, because it's the only secure substitute they know.

Wealth tends to make people unhappy because it encourages them to try to translate all their fantasies into reality—an exhausting and usually disappointing pursuit. The needs of the heart, which can be satisfied only by *unmanipulated* reality, are ignored by the ego in its search for empty emotional calories. One begins to feel that the obstacles and frustrations of life are meaningless nuisances—one develops a bulldozer mentality. Learning and growth are very difficult with wealth because they depend on experiences in real life, and wealth enables you to buy *out* of life. You can never find out, for example, what your most satisfying calling might be, since experience need play so little part in its evolution. If you want to be a writer you can pay a vanity press to publish your book. If you fancy yourself as an opera singer you can hire a hall, as one wealthy women used to do periodically, and hire the audience to go with it. Whatever *real* talents lie dormant in a wealth addict of this kind may never be discovered, because his or her most juvenile self-images can be acted upon indefinitely.

Wealth has a narrowing effect on the soul because it gives too much control to the ego. When we have too much conscious power to shape our own destiny, *our future is limited by the narrow goals of the conscious mind, and the constriction brought about by our power to make the world safe for ourselves.* Safety is stagnation, for only when we're risking something does life become exciting and joyous. Since wealth provides many kinds of security, vitality and growth can be gained only when the wealth itself is risked.

Poverty, of course, makes people miserable in the opposite way. Just as too much ego can constrict us, so can too much necessity. Growth and happiness depend on a balance of power between the two. People should have some capacity for choosing among options, and the truly poor are unable to enjoy this luxury. They are oppressed by necessity because wealth addicts have so arranged things that it's almost impossible to survive without acquiring money, which puts normal people at a distinct disadvantage.

But what of the middle class, with its material comforts and upward strivings? Are they just frustrated closet junkies, or do they really have weaker, more benign habits? How do we detect signs of addiction in ourselves? What is the point at which a natural desire to eat well, be comfortable, and have pleasant surroundings becomes a disease?

The key sign of addiction is the feeling that one cannot face the day without some form of external security—a drink, a fix, proper clothing, a full wallet, or whatever. It's the feeling that naked we are inadequate. The symptoms of addiction are (1) controlling, (2) grasping, (3) clinging, (4) ensuring. Addiction is a closed fist—it's the conviction that if we let go of what we have today, it won't come back tomorrow. In my own life I've been addicted to many things, and the way I learned to detect each addiction was very simple: the things I was addicted to I never let myself run out of. An addict attempts to be well supplied.

Wealth addiction usually expresses itself through *possession*—the need to monopolize the use of something. Possession is a way of ensuring access to whatever it is we want to enjoy—and therefore of preventing others from having access to it. There's always a certain insecurity behind ownership: we want something before anyone else gets it, or before it gets more expensive, or before it's gone altogether. Ownership is a way of grasping and clinging to something we're afraid will be taken away from us.

Now, ownership is a way of life in our society, and a disease is usually regarded as a departure from some norm. We need to discriminate between those who merely share a

(*Continued on page 108*)

LCD Watch Breakthrough...

MICRO-ALARM

a 6-digit 6 function LCD Alarm Watch for only $69.95!

At last, a constant readout (no buttons to push) precision quartz electronic watch with a built-in 24 hour alarm system.

A quiet revolution has been taking place in the electronic watch industry during the last few years. Push-button LED's are being replaced with continuous-display LCD watches; 4-digit displays are being replaced by 6-digit readouts. This year there will be many such LCD watches available.

However, Winthrop-Rogers prides itself on offering not only the most technologically-perfect products available, but also on introducing the most technologically-advanced products on the electronic market before they are readily available. Therefore, we are pleased to announce the most remarkable achievement in electronic watch technology to-date.

By combining the quartz-accuracy precision of the LCD watch with miniaturized alarm technology, we proudly introduce the first CONTINUOUS DISPLAY ALARM WATCH. A watch that may not be available from other sources for years can now be yours at a price hundreds of dollars less than you would imagine.

And now consider the incredible convenience of a portable alarm clock handsomely adorning your wrist at all times ! ! !

- *Never again missing an appointment because you lost track of time.*
- *Never again missing a plane or a train because you didn't relize how late it had become.*
- *Never again forgetting to make that all-important phone call.*
- *Never having to worry about forgetting to take important medication on time.*
- *Never worrying about waking up from that catnap, or at a hotel if your wake-up call isn't on time.*
- *Always being aware of when you should be coming or going or doing all that your hectic schedule demands – without devoting your valuable time to trying to remember it all.*

7:55AM

SET TO RING AT 7:55 A.M.

THE ALARM

The MICRO-ALARM has a 24 hour Alarm System, allowing you to set your watch to signal at any minute of the day or night (1,440 settings per day are possible). Once set, you need not be concerned about your next appointment or train, plane or phone call. The MICRO-ALARM will remember for you and remind you when you need to be reminded.

SNOOZE/REMIND CONTROL

For your convenience the MICRO-ALARM will give one short beep prior to its full alarm cycle, allowing you to turn it off without disturbing others. If not deactivated after the first short beep, the alarm will then beep for 15 continuous seconds. Push the deactivate button twice and the alarm is off. However, should you want a further reminder, then push the deactivate button only once and the alarm will go through its cycle again in exactly 5 minutes, allowing you to continue your current activity whether it be a snooze or phone call without fear of forgetting your next commitment.

Order now for the holidays!

12:34 AND 56 SECONDS

12:34 56

6-DIGIT LCD DISPLAY

The MICRO-ALARM has a 6-digit readout showing hours, minutes and seconds at a glance. Since the readout is by Liquid Crystal Display (LCD) and not by Light Emitting Diode (LED), no button has to be pushed; the time is continuously displayed! A built in night-light functions at the push of a button for reading in darkness.

AUGUST 15th FRIDAY

8:15 FR

CALENDAR DISPLAY

Just one push of the control button converts the display into a 3-function calendar; displaying the month, date of the month, and day of the week. The remarkable memory built into the module knows each month and the number of days in that month and resets automatically on the first day of the new month.

QUARTZ ACCURACY

The MICRO-ALARM is extraordinarily accurate. Its module is manufactured by Hughes Aircraft Company, one of the world's foremost manufacturers of micro-electronics, and is guaranteed accurate to within 3 minutes a year (averaging less than 15 seconds per month). You can depend on the accuracy year after year. There are no moving parts, so there is nothing to wear out or even require servicing. The result of this accuracy is that you can set your watch to the second.

THINK ABOUT IT!

Even if you have no consistant need for a watch with a built-in electronic alarm, the MICRO-ALARM is a valuable investment for its watch features alone:

1. **It is the most up-to-date fully-functioning electronic watch available today.**
2. **It is accurate to +/- 15 seconds per month, and never has to be wound – put it on, and the time and date are correct even if it has been in a drawer for a month!**
3. **Its elegant styling will compliment any attire – and elicit compliments from your associates and friends.**
4. **At this price you can not find a better buy.**
5. **One day you will have a critical need to be reminded of a vital appointment – and then, having used the alarm function once, you will never again return to any other reminder system.**
6. **Why buy an ordinary watch when you can own a MICRO-ALARM?**

ELEGANT MESH BRACELET

Each MICRO-ALARM comes with a 1 year limited warranty. You may order in your choice of gold-tone or silvertone case. Each for only $69.95 plus $1.99 for shipping and handling. Each MICRO-ALARM comes with a matching, elegant, thin mesh bracelet, more handsome and much more practical than those "pull over-snap" type bracelets. This band adjusts comfortably and easily, eliminating cumbersome link adjustments.

15 DAY TRIAL

Wear the MICRO-ALARM for 15 days to assure yourself that this is no ordinary watch. If at the end of that time you are dissatisfied for any reason you may return it for a prompt refund, no questions asked.

To order by credit card please phone our 24-hour toll-free number:

800-325-6400 ask for Oper. 36

In Missouri: 800-342-6600 ask for Operator 36

or mail the attached coupon with your payment and the MICRO-ALARM will be on its way to you.

Allow 3-4 Weeks For Delivery

Winthrop-Rogers Ltd. V6611

Box A69, 1135 Greenridge Rd., Buffalo Grove, Il 60090

Please send ____ MICRO-ALARMS @ $69.95 each plus $1.99 for shipping and handling.

____ Silvertone MICRO-ALARM

____ Goldtone MICRO-ALARM

If I am not completely satisfied I may return it for a full refund. Total amount enclosed $____, check or money order. (Illinois residents please add 5% sales tax.) No C.O.D.s please.

Charge: ☐ Amer. Exp. ☐ Bank Amer./Visa

Please Print ☐ Master Charge MCBK# ____

Card # ____ Exp. ____

Signature ____

Name ____

Address ____ Apt. ____

City ____ State ____ Zip ____

To expediate shipping by UPS, please provide street address rather than P.O. Box number.

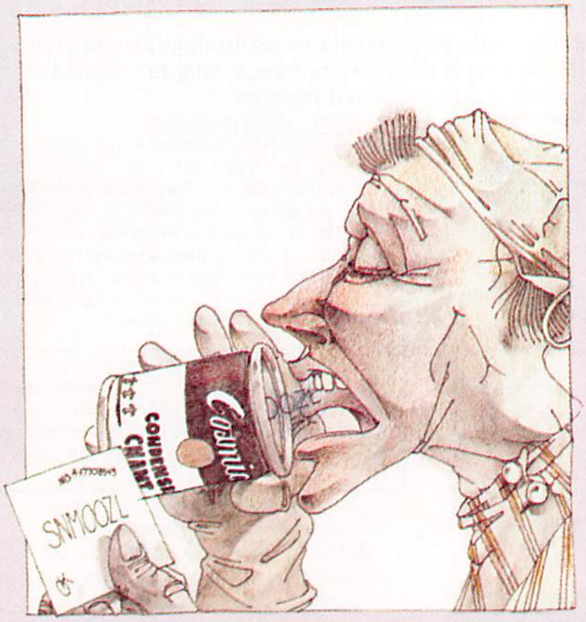
OM'S LAW

Inside a chant plant

MARTHA SAXTON

DELHI—A spokesman for the Study of Indian Resources announced today the results of a two-year research project, conducted with the cooperation of the Harvard Business School, to link this nation's natural resources with the United States markets. The SIR investigation posits that the American boom in Transcendental Meditation has created an expanding market for a steady and continuous supply of mantras. Old production methods, relying on fate, numerology, or holy men, are deemed woefully inadequate to fill today's needs.

To meet this growing challenge, SIR announces the completion of its until now top-secret "chant plant." This enormous factory, constructed to block the busiest intersection in Delhi, was designed to tap the most active source of native syllables in the country. Plant employees circle the concrete building trapping in lidded Styrofoam containers the phonemes arising from the angry crowd milling around the obstruction. Pairs of syllable-holders are then put on a conveyor belt where they travel to the mixers, who rapidly remove their lids, hold the containers together, and shake vigorously to blend the sounds. One raw mantra is produced every twenty seconds.



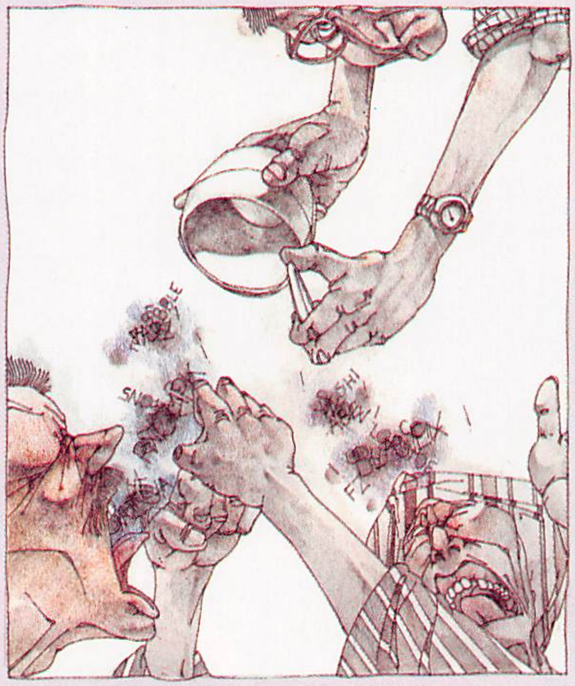
An expert elocutionist delivers his mantra into a sterile tin can.

These tentative sounds are sent to Quantity Control. Here workers selected for the size of their English vocabularies listen to the raw material to determine whether they have ever heard an English word like it before. If they have, the mantra is discarded into soundproof receptacles in compliance with the noise-pollution regulations. If not, the putative mantra is transliterated onto a three-by-five-inch index card and sent on to the researchers. They check the word against the unabridged Oxford dictionary, the Encyclopaedia Britannica, and the last forty years of the *New York Times*. A multisyllable

MARTHA SAXTON's biography of Louisa May Alcott will be published in the fall by Houghton Mifflin.

sound, for example, resembling "Kate Smith" or "dental floss" must be sacrificed.

If the mantra survives this ordeal, which, according to Harvard time-motion studies, should take from 43 to 45 days, it goes to the Refinery. Here its edges are smoothed. Market researchers have noted American preferences for soft, rounded experiences like power steering and marshmallows, and have tried to adapt this knowledge to their mantra design. Refiners highly skilled in "comfort phonetics" weed out hard or accusatory sounds like "nutx" or "zard," softening them down to equivalents like "nursh" or "sarp." When the mantra's sharp edges have been edited off, it proceeds to the cannery.



SIR chant plant employees trap angry protesters' phonemes in lidded Styrofoam containers.

ILLUSTRATED BY DAVID A. JOHNSON

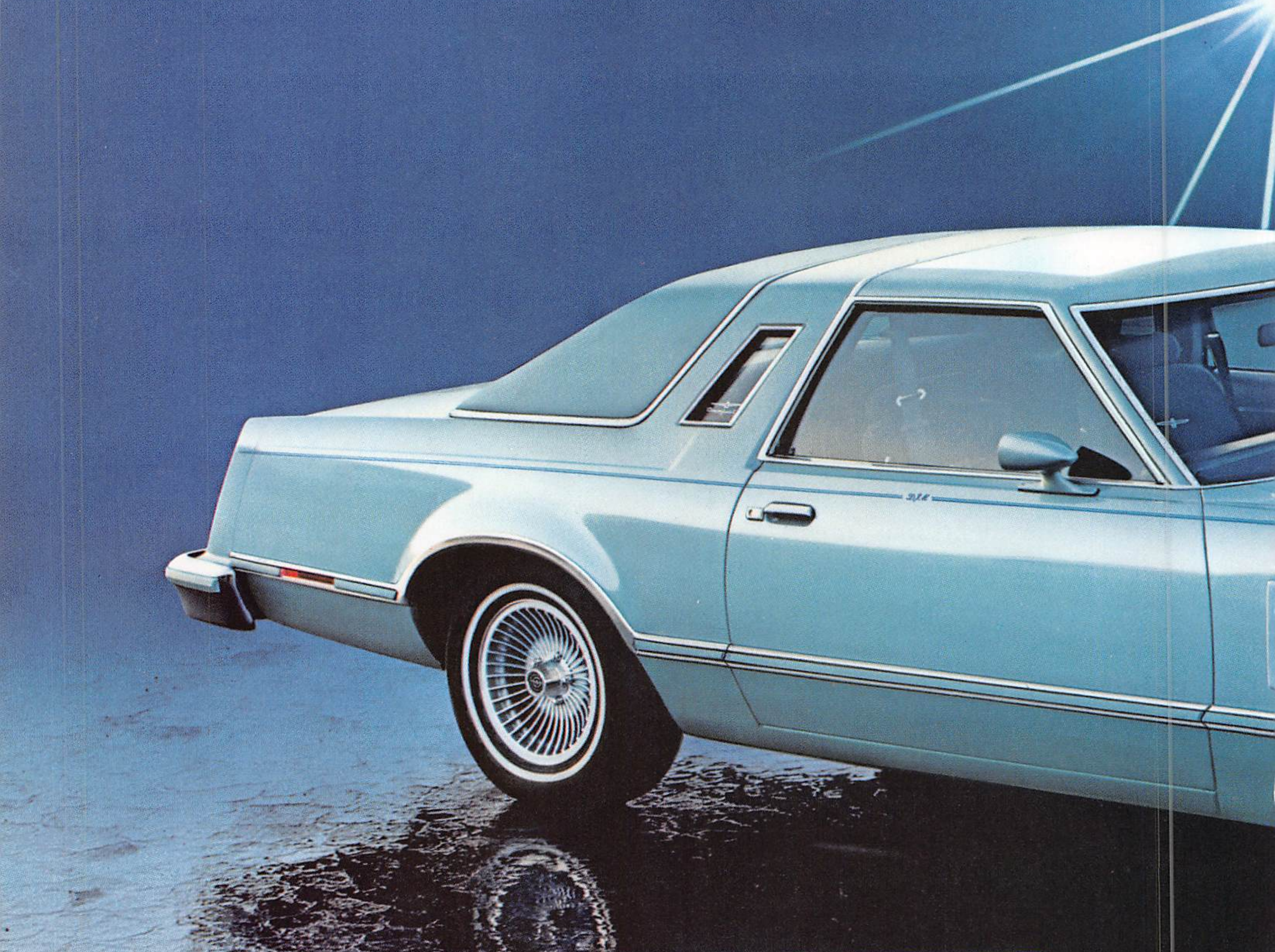
In Canning, one of a team of experienced elocutionists picks the written mantra off the conveyor belt with his left hand. He is allotted two and a half minutes of subvocalizing time to practice the sounds. Then, holding in his surgically gloved right hand a sterile tin can close to his lips, the speaker delivers his mantra into the container, as precisely and mellifluously as his years of training allow. "Stroonplish," he enunciates with lyrical exactitude. He immediately puts the can into a sealing machine to prevent bacteria from unbalancing the purity of the tone.

Quantity Control examines a raw mantra for sounds corresponding to English words.

The sealed cans go to Packaging, where they are swaddled in gaily colored felt jackets to keep the slightly humming cans from irritating each other during transport. In Fulfillment, the felt cylinders are packed into shipping crates, two dozen to the box. One crate is shipped to New York per day, keeping well under environmental and tariff standards on the number of foreign decibels allowed into the United States daily.

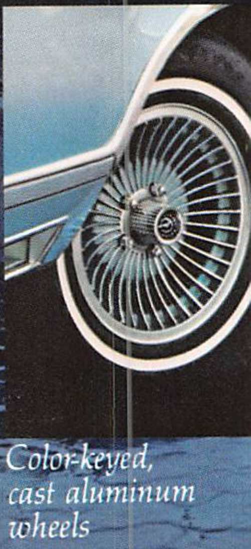
Pending the success of the mantra venture, SIR has further plans to cultivate, refine, and can for export keening, which occurs abundantly in the Indian countryside.

The most exclusive new Thunderbird you can own:



Elegant Pinstriping and color-keyed bumper rub strips

Deep-cushioned, all-cloth split-bench seats. Standard 6-way power driver's seat, power windows and door locks



Color-keyed, cast aluminum wheels

The 1978 Diamond Jubilee Edition.

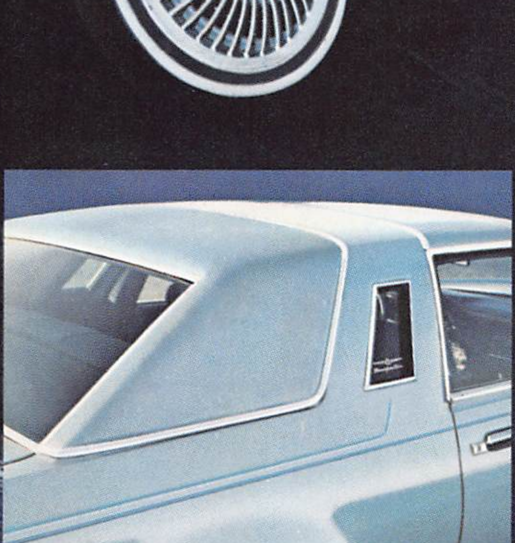
Here, to help celebrate Ford's 75th Anniversary, is the ultimate Thunderbird for 1978. We've built this exclusive new Thunderbird with such custom touches as a distinctive formal roof, a hand stitched leather covered pad on the instrument panel, 36 oz. carpeting, 22K gold finish owner nameplate, a pleasant chime to remind you to buckle-up and much more. One look should show you why this is the most exclusive new Thunderbird you can own. One visit to your Ford Dealer and we think you'll be convinced a new Thunderbird legend is in the making.

FORD

When America needs
a better idea,
Ford puts it on wheels.

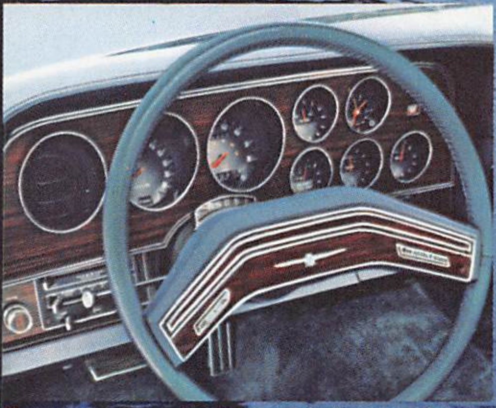
THUNDERBIRD
FORD DIVISION

Ford
75th ANNIVERSARY



A distinctive formal roof. Illuminated entry system is standard

Personalized initials on door

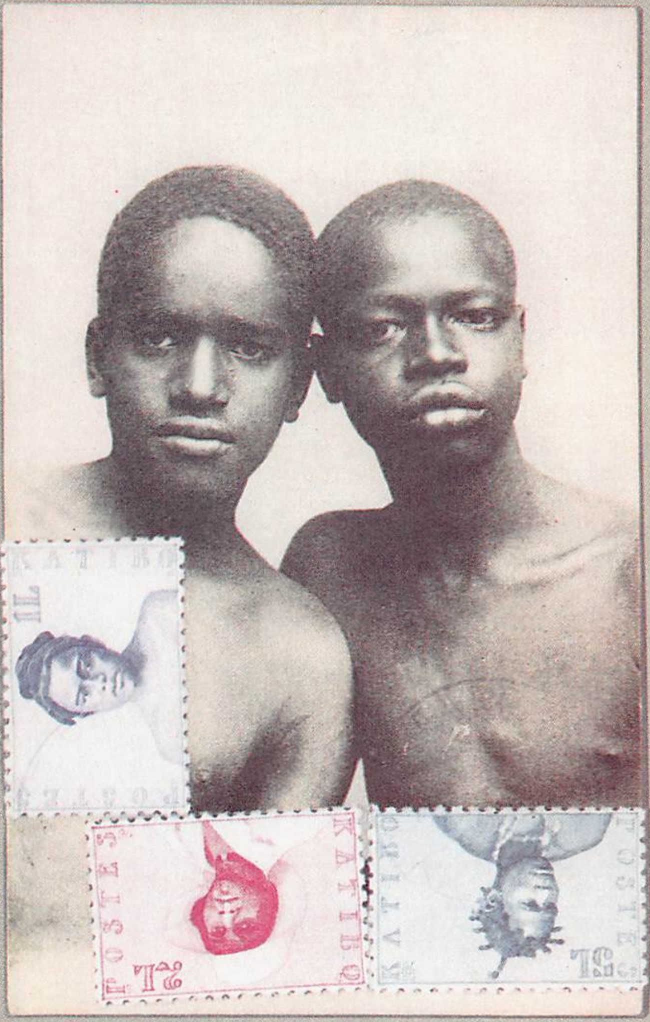


Sports instrumentation cluster and leather-wrapped luxury steering wheel both with Ebony woodtone applique

SMALL IS BOUNTIFUL

The mini-world of Donald Evans

KATIBO. 1962. Women of Katibo (1975-76) *Collection of Walter Nobbe, The Hague*



"Katibo is a word in Surinamese suggested by an architect friend in Amsterdam from Surinam named Lucien. It means 'one who sets himself free.' Katibo, then, is a black revolutionary country, and these are its new stamps: proud tribal women who in turn have set themselves free. The wife of the ruler is on the 2 L (2 Lucien); she keeps getting her picture put on the stamps anonymously because even this country is a bit corrupt. I keep my eyes open for old postcards that trigger ways to use my stamps as elements in a composition, which is why, for instance, the 2-Lucien and 5-Lucien stamps are upside down."

WILLIAM KATZ

Donald Evans had a large gift for small things, for condensing whole countries to the size of postage stamps. His work, displayed on these pages with his captions, marks him as one of the most able miniaturists of his generation.

Born in Morristown, New Jersey in 1945, Evans grew up on the shores of a lake where he developed a childhood passion for building intricate sand castles and cities. He began collecting stamps when he was six years old. At about the age of 10, bored with real stamps, he began to watercolor his own. Five years later, he had painted more than 1,000 stamps from 40 imaginary countries—a hobby that he then abandoned in favor of serious matters like high school and Cornell University, where he earned his architect's degree in 1969.

Evans worked for three years as a designer for the well-known architect Richard Meier in New York, but his own art soon took precedence. In 1972, encouraged by friends who had seen his childhood stamps, he quit his job and went to live in Holland, taking with him his fine-pointed Grumbacher #2 brush and a stock of perforated typing paper—the canvas for his kind of painting.

He lived in the village of Schalkwijke on a little road called Achterdijk, which means "behind the dike." At a table by the window, he began painting stamps that commemorated visits from the postman, whom he and some friends coaxed off his appointed rounds for a cup of coffee.

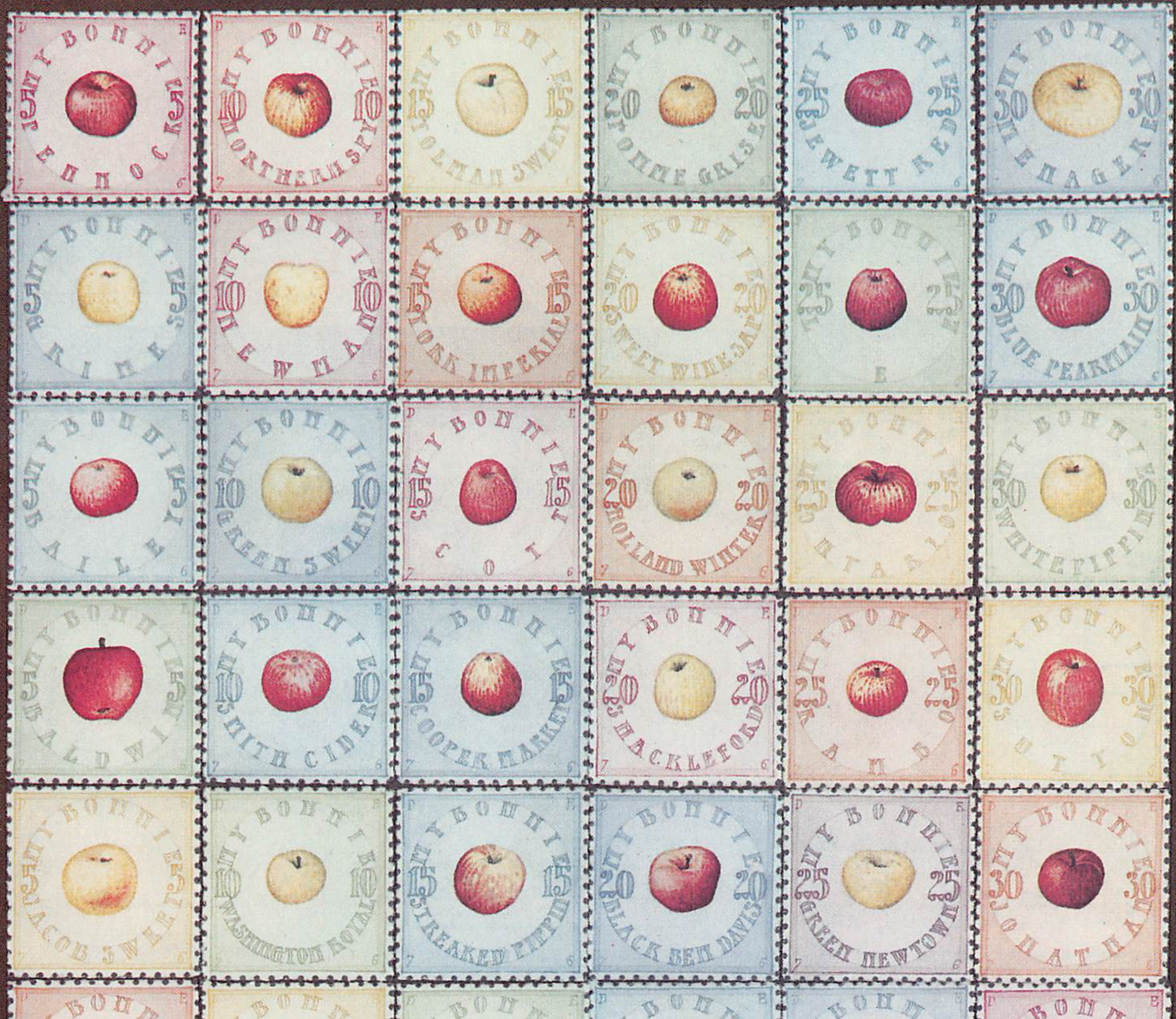
From that time until April 28 of this year, when he died at the age of 32 in a fire in a friend's Amsterdam apartment, Donald Evans painted more than 5,000 stamps from over 30 different countries—named for friends and for places where he had lived, or imagined living. The stamps were a journal of his life, used to record information about people and interests and events, and to catalogue the great variety of the real world. Evans kept a meticulous record of each stamp in a 250-page volume entitled *Catalogue of the World*, which was in its 15th edition at the time of his death. Some of his countries are represented by more than 200 stamps: certain places were so compelling that he returned to them again and again. All his stamps have issue dates; many are canceled with their own special postmarks, which Evans made by carving into rubber erasers.

Although his career as a public artist lasted only five years, Evans appeared in 13 one-man shows and 15 group shows here and abroad. Many galleries and museums have purchased his work. This March, the Netherlands post office commissioned him to design his first "real" stamp. The day of issue was to be next spring, to coincide with the opening of his one-man show at the Stedelijk Museum in Amsterdam. Now his make-believe stamps must suffice to represent his wit, charm, and originality.

—MOLLY McKAUGHAN

MOLLY McKAUGHAN is Managing Editor of *Quest/77*

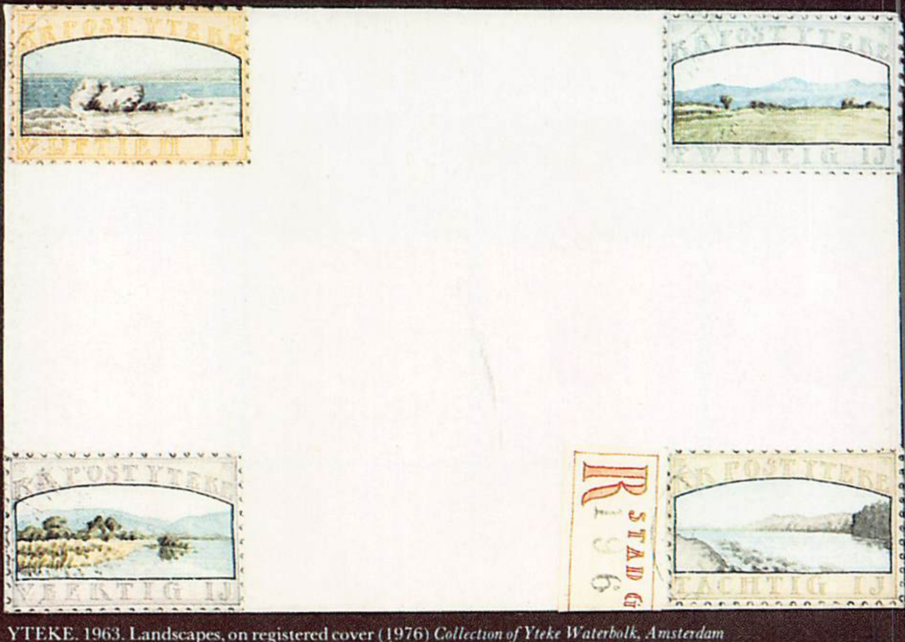
MY BONNIE. 1962-67. Apples (1967) *Collection of James Duffy, New York*



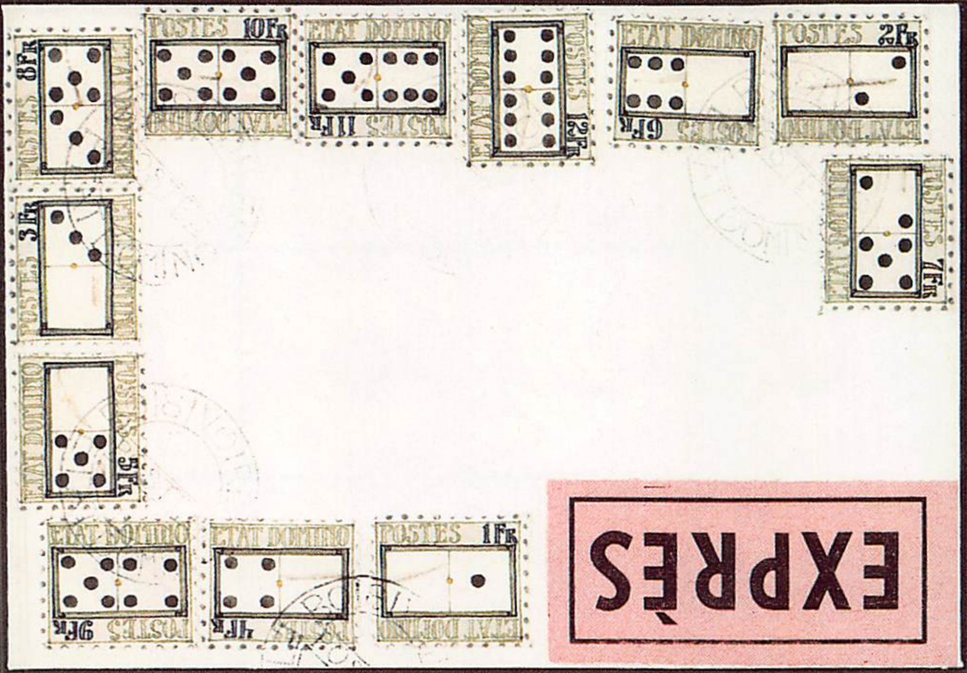
ALL ART COURTESY FISHBACH GALLERY, NEW YORK

"A couple of years ago I asked Edward Albee if he would think about a name for a country that would sound American. He came up with My Bonnie, which is really Scottish, but works for me when I'm in Amsterdam, looking over at America. The apples were chosen for their voluptuousness of color and their relation, one to another, in size, and they were arranged so their background colors read down diagonally. I think of my work as explaining things in a way that makes sense. In the case of apples, there are so many and they're so beautiful that I like to show lots of them; the impact is, I hope, very apple-like."

"Yteke is a Dutch friend of mine who was a dancer. She had to give up her career because she couldn't stand heat—performing under the hot lights. I wanted to name a country for her and it seemed imperative that it be cool and northern and refreshing for her. These four views of her country could also be thought of as portraits of her."

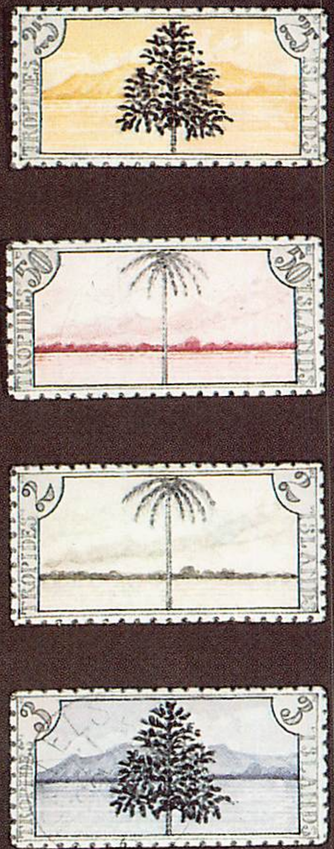


YTEKE. 1963. Landscapes, on registered cover (1976) *Collection of Yteke Waterbolk, Amsterdam*



DOMINO. 1930. Dominos, on express cover (1974) *Collection of Patty Tang, New York*

TROPIDES ISLANDS. 1930. Allegorical landscapes (1975) *Collection of Anne Dunn, Lambesc, France*

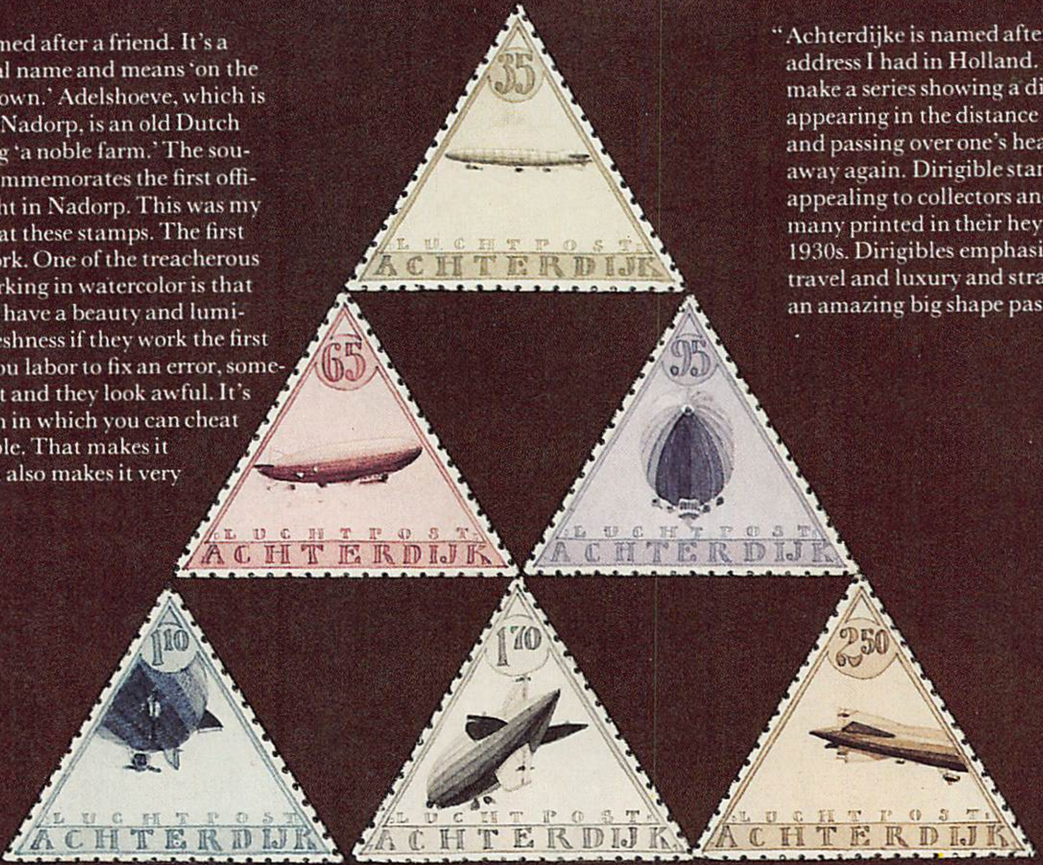


"I made the domino stamps because I like to play dominos and I thought they would look terrific on stamps, so I named a country Domino and it was only after I made all the stamps that it occurred to me I could put them all together like a domino game and lay it out on an envelope. The Express sticker anchors the one empty corner; I put it on upside down so it would just sit there like a colored shape. One of the nice things about using stamps as an artistic medium is that everything is already broken down into little building blocks that you can put together the way you want to."

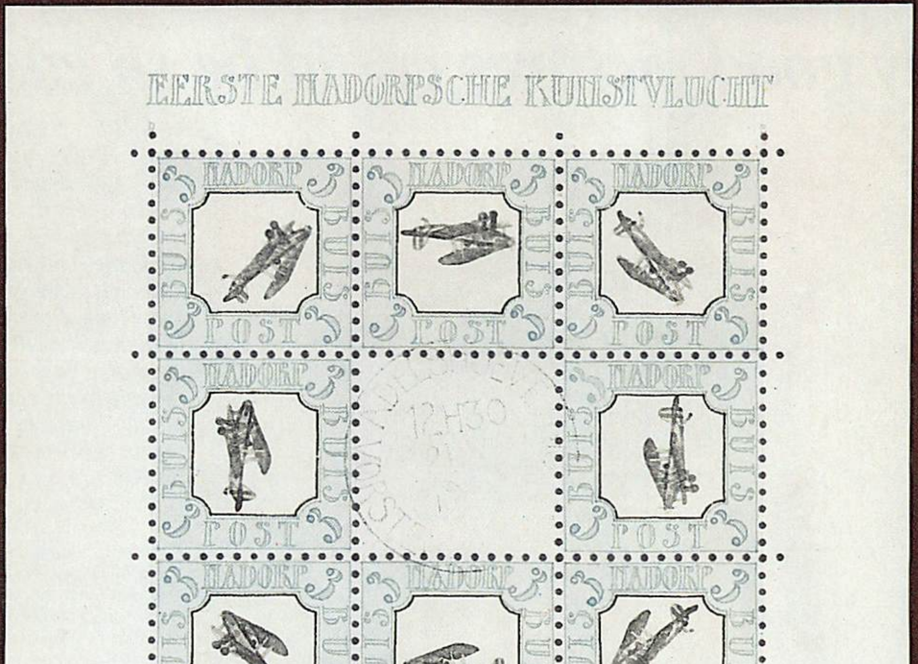
"Tropides got made up one hot summer night while I was visiting some friends who live in the Catskills, and we played games with the word 'tropics.' A friend, Cy Johnson, constructs small theaters and his 'Oasis Theatre' has palm tree columns on the facade. I decided that design would work with these stamps, which could be very wide, supported in the middle by a column which was a palm tree. The islands also grow coffee, so I put coffee trees on two of them, which works better than four palm trees. It took a while to arrive at that solution. I had to read books about the tropics."

"Nadorp is named after a friend. It's a rather unusual name and means 'on the other side of town.' Adelshoeve, which is the capital of Nadorp, is an old Dutch word meaning 'a noble farm.' The souvenir sheet commemorates the first official stunt flight in Nadorp. This was my second effort at these stamps. The first one didn't work. One of the treacherous aspects of working in watercolor is that the paintings have a beauty and luminosity and freshness if they work the first time, but if you labor to fix an error, something goes flat and they look awful. It's not a medium in which you can cheat and fool people. That makes it special, but it also makes it very difficult."

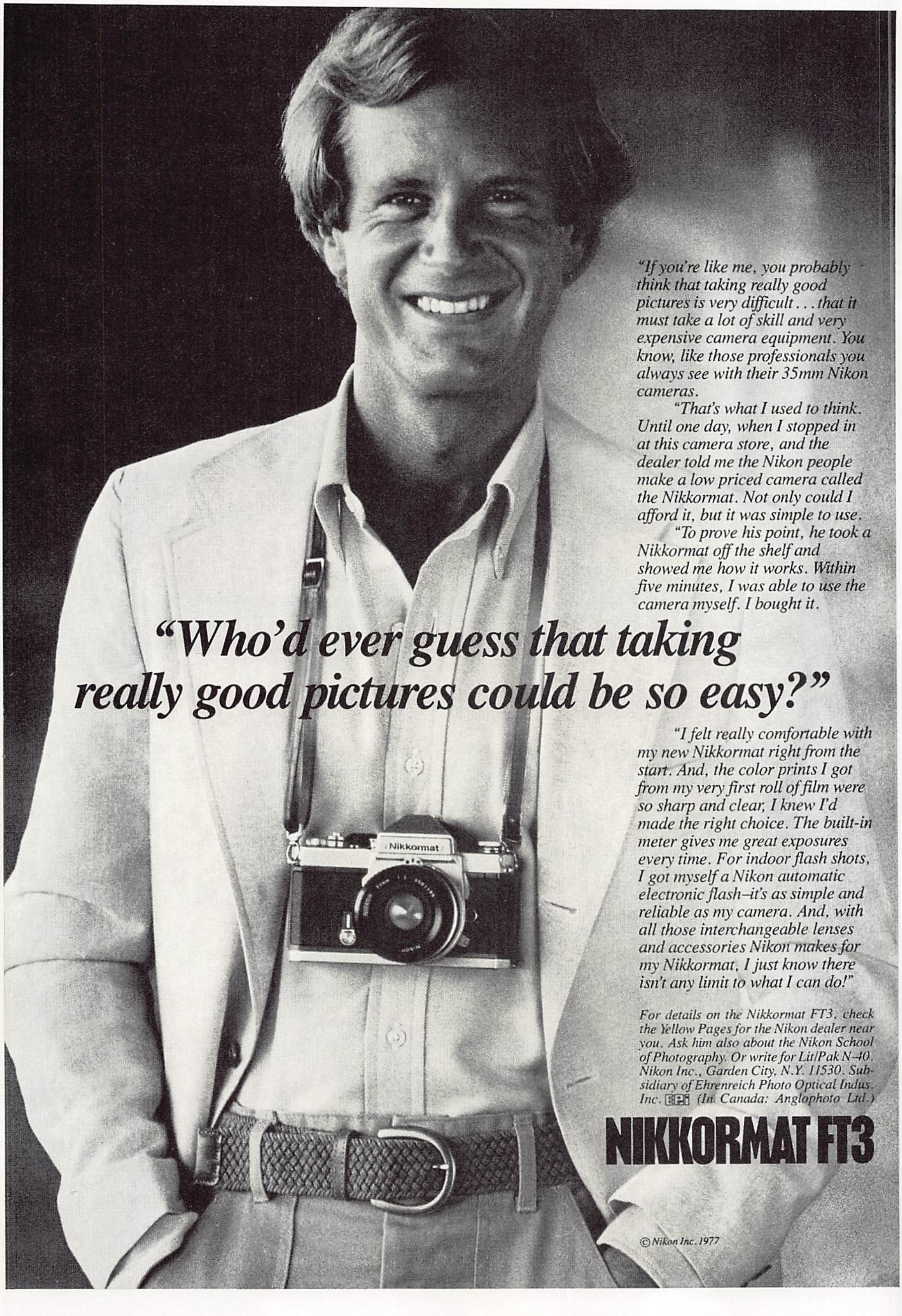
"Achterdijke is named after the first address I had in Holland. I wanted to make a series showing a dirigible appearing in the distance and coming and passing over one's head and going away again. Dirigible stamps were very appealing to collectors and there were many printed in their heyday in the 1930s. Dirigibles emphasize the idea of travel and luxury and strangeness—such an amazing big shape passing overhead."



ACHTERDIJKE. 1932. Airpost: Dirigibles in flight (1974) *Private collection, Amsterdam*


EERSTE NADORPSCHE KUNSTVLUCHT
NADORP
3
BUIS
POST
12H30
VLIEGVELD TE ADELSHOEVE VI. 1924

NADORP. 1924. Stunt flying. Block of eight stamps in souvenir sheet (1976) *Collection of Werner Kramarsky, New York*



"Who'd ever guess that taking really good pictures could be so easy?"

"If you're like me, you probably think that taking really good pictures is very difficult . . . that it must take a lot of skill and very expensive camera equipment. You know, like those professionals you always see with their 35mm Nikon cameras.

"That's what I used to think. Until one day, when I stopped in at this camera store, and the dealer told me the Nikon people make a low priced camera called the Nikkormat. Not only could I afford it, but it was simple to use.

"To prove his point, he took a Nikkormat off the shelf and showed me how it works. Within five minutes, I was able to use the camera myself. I bought it.

"I felt really comfortable with my new Nikkormat right from the start. And, the color prints I got from my very first roll of film were so sharp and clear, I knew I'd made the right choice. The built-in meter gives me great exposures every time. For indoor flash shots, I got myself a Nikon automatic electronic flash–it's as simple and reliable as my camera. And, with all those interchangeable lenses and accessories Nikon makes for my Nikkormat, I just know there isn't any limit to what I can do!"

For details on the Nikkormat FT3, check the Yellow Pages for the Nikon dealer near you. Ask him also about the Nikon School of Photography. Or write for Lit/Pak N-40. Nikon Inc., Garden City, N.Y. 11530. Subsidiary of Ehrenreich Photo Optical Indus. Inc. EPI *(In Canada: Anglophoto Ltd.)*

NIKKORMAT FT3

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WOMAN ALIVE

Self-discovery in Yellowstone National Park

CONSTANCE BROWN

No one had escaped getting wet. Not the other 12 students, nor our three instructors. We were approaching the end of the frozen-snow-covered expanse of Shoshone Lake after almost eight miles of forced marching when the skiers ahead suddenly began to split out of the leader's track. They staggered off in every direction as if they were trying to wade through taffy.

I was near the end of the line, and intended to circumnavigate the suspect area where lake water had seeped up through cracks in the ice. But as soon as I stepped outside the track, I too became entrapped in slush that rose over my ski boots. I tried to move ahead, but the weight of my 65-pound pack pushed me in deeper.

"There's no cause for alarm," Louise Richardson, my instructor, was saying. "Try to put your skis across the other people's tracks; you won't sink so deep." But the suction was too strong. It had cemented my skis in place.

My breathing was increasingly heavy and rasping, and I started wildly thrashing my arms and ski poles. The pack's weight made me feel like a pregnant cow stuck in a bog. I was panicking and couldn't stop myself.

Frantically beating the slush ahead with my pole, I tried to locate one of my ski tips. Suddenly I made the connection and pulled up sharply with all my strength, trying to surface it. The ski shot up so fast that I lost my balance and fell straight back into the water, with my pack anchoring me to the ice beneath it.

"Get out of your pack," Louise directed. "I'll pull it out for you." I yanked off my right glove and fingered the submerged waist belt, searching for its buckle.

Released, I followed her to an area about 30 feet away that was snowpacked and dry. I maneuvered easily without the great green manacle weighting me into the slush. Louise dropped her pack and backtracked for mine. Watching her, I suddenly felt ridiculous for having made such a scene. She didn't say anything when she helped me hoist the pack onto my back.

That night in camp, she suggested I try drying my clothes by sleeping with them. "If this was the last day of the course you could just stuff them in your pack and carry them out frozen," she said, "but we've got another week left, and the same kind of thing could happen tomorrow and you wouldn't have any to spare."

Our group of 16 had split into sleeping configurations of eight, sheltered by two custom-made nylon tents, one orange and one blue, that we suspended on ropes between trees. I slept in the blue tent with three cookmates and one other cook group. We laid our mummy-style Dacron sleeping bags on insulated foam pads and extra clothing to separate us from the compressed-snow floor. Candlelight illuminated puffs of vapor rising from our bags. We looked like a row of toppled wooden Indians, smoking peace pipes in prone positions. Almost every night I awakened to groans of "Gaw . . . ahg-h-h-h . . . help, help . . ." emanating from the depths of cooking partner Mike Schendel's bag, where he'd become lodged away from the air hole. We all experienced varying degrees of claustrophobia, sleeping with only our noses exposed to the air, which dropped to 16 below zero.

That night the tent was pitch-black and silent when I began to giggle quietly in the darkness. Several hours before, I had taken Louise's suggestion and stuffed my wet wool clothes down around me in my bag. I was shivering as my body tried to generate enough heat to dry them. I popped another M&M candy into my mouth and tried to be philosophical. "Gosh," I said aloud to the seven sleeping bodies around me, "I'm functioning just like an automatic coin-operated clothes dryer."

My breathing was increasingly heavy and rasping. I was panicking and couldn't stop myself.

CONSTANCE BROWN, a free-lance writer and former editor of *Inside Aspen*, has gone on from this experience to a backpacking expedition in Alaska.

This was what academics had lately tagged "experiential outdoor education"—and I was testing a hallowed National Outdoor Leadership School field theory right now. It postulated that my body heat would warm my clothes while the synthetic sleeping bag was wicking their moisture away from me and out through its crimped fibers to the freezing air in the tent.

I really didn't care what happened to the moisture then, but I suspected I'd encounter it again. It would rise and condense on the inside of the nylon membrane, transform into frost, and hang there until morning, waiting to chill me again if I made one careless move and bumped the tent roof when I stood up. Sometimes I thought the elements were out to get me.

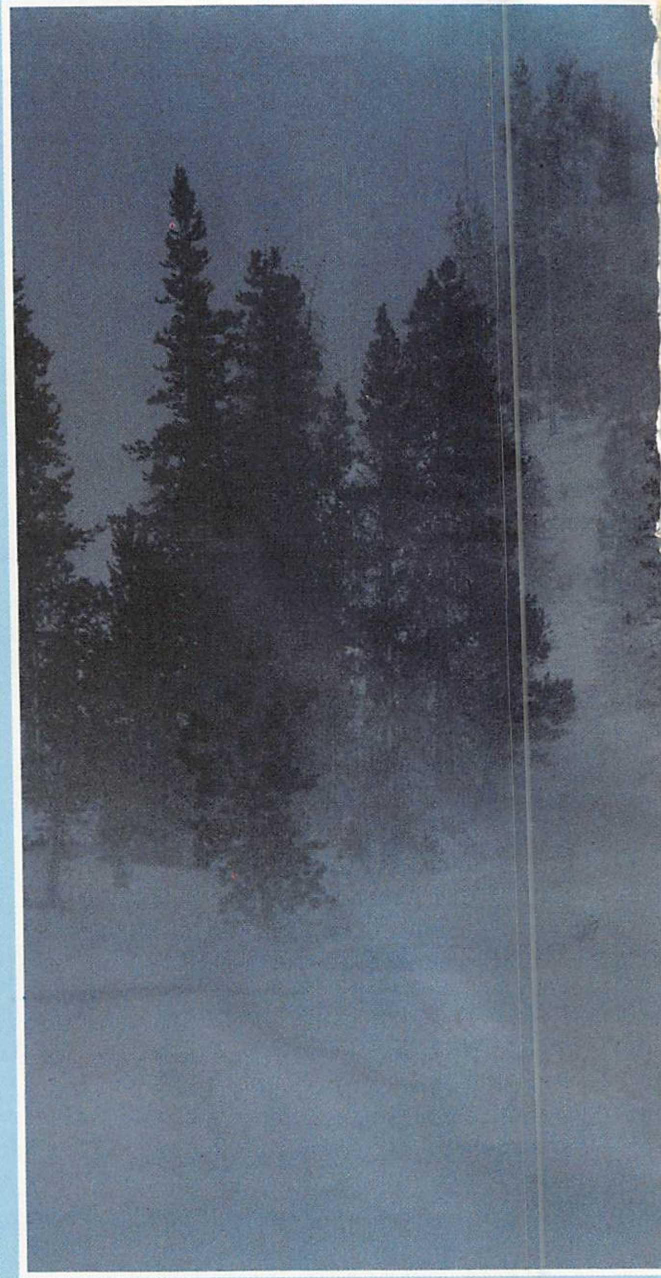
But all I cared about now was getting warm, falling asleep, and drying my clothes without any further discomfort. No further discomfort? I knew what Willy Cunningham, my course leader, would say to that: "I don't especially like having frozen fingers either. But experiencing the wilderness is not like looking at it in the pages of a Sierra Club coffee-table book. You can't walk through dew without getting wet."

He was right, of course, and I knew it. There weren't many shortcuts or compromises in anything worth doing. I had wanted to experience the mountains in winter; so I'd signed up for a complete NOLS package, and followed Willy out into Yellowstone National Park on a two-week ski-touring expedition.

To my surprise, I was discovering that time passed in the wilderness much as time passed anywhere else. Hours progressed in a series of minor mishaps and transitory triumphs that were never too severe to surmount, nor so complete that I could shout "I've won" and toss in my towel. Instead, like most everyone else, I was doggedly pushing ahead, through time and experience, wondering where the prize was, not even sure what the prize was.

I carried a burden of slight discomfort around like excess baggage. And rather than fighting it, I was learning to support and, in some cases, transcend it.

But there were some absolutes: the weight of my pack was one that I couldn't transcend or support. I had let my pack become my master on several occasions. It commanded me to look



The pack's weight made me feel like a pregnant cow stuck in a bog.

PHOTOGRAPHS BY PAUL CHESLEY

Snow fell even when the sun was shining—lightly, dry and soft, shaken off in an instant.

downward at my feet, and shoved me into the snow whenever I faltered or hesitated on my skis. It controlled every stride I made. And I hated it—as I would hate a tyrant.

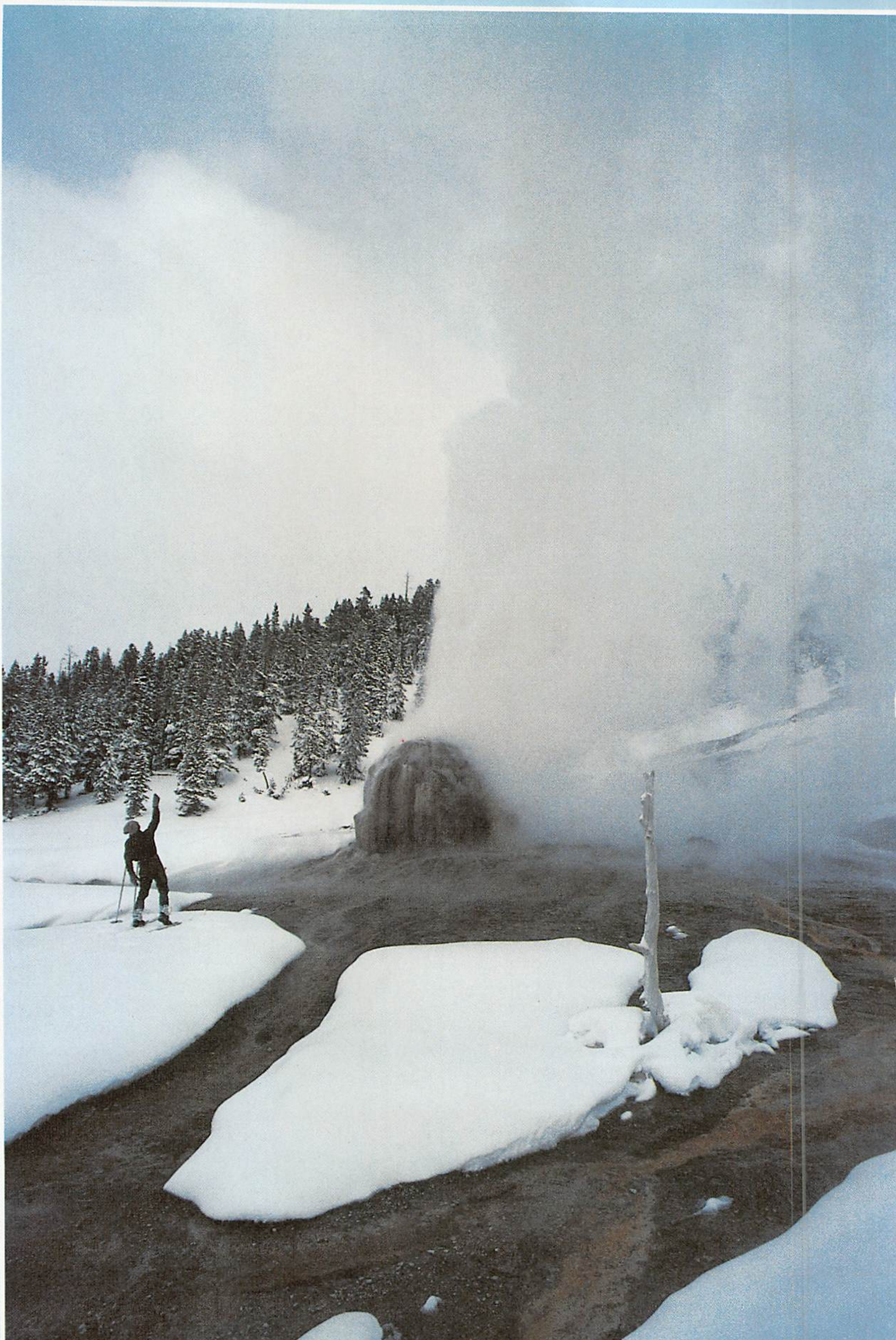
Yet at night, as soon as I set it down, it was transformed into a helpmate containing everything warm, dry, and comforting. I couldn't survive for long without it. It was one of many paradoxes that were sharply defined in the mountains.

"Don't be afraid to give up some weight to a stronger expedition member," Willy had said back at NOLS headquarters. "But don't be afraid to try carrying it either."

I'd done both. I'd already unloaded close to 10 pounds, and I still couldn't hoist the dead horse onto my back alone. Nobody minded helping me lift it up after every rest stop on the trail, but I minded asking. I'd worked at being an independent woman for so long that I found one of the most difficult aspects of the expedition was asking my companions for assistance.

I prided myself on individual accomplishment. I'd just passed my 30th birthday; I was already the editor of a successful small magazine in Aspen, Colorado, and I'd been able to purchase my own home there. I was receiving exciting free-lance reporting assignments, and I'd found a man to work with and love. I credited it all to perseverance and hard work on my part, and I frequently neglected to connect my good fortune with other people's active support or acquiescence. Now, in the wilderness, my situation was more clearly delineated. I needed other people; it was that simple.

"It's hard for any of us to ask for help," Myles Bakke, another of my cooking partners and a wildlife biology teacher, commented one evening. "We're all alpha personalities—people who are used to making decisions."



Hot springs are surely the prototype for watercolor paintings. A muted wash of earth colors melts away a frame of white snow around their pools and channels.

This was true; almost all of us were working people, with an average age of 29—an older group by NOLS standards. Most of the 2,000 students who attend the school's various outdoor education courses are college age, and participate during summer vacations, or as part of their academic programs. For many young people, NOLS serves as a rite of passage, one of the few available in American society today besides the military.

For a course to be successful, each participant has to balance an intense sensitivity to himself or herself with an equally alert sensitivity to others. No matter what our ages, we were learning fast to take responsibility for our actions. I couldn't blame anyone else for my wet, cold condition in the sleeping bag that night at Shoshone Lake, and I'd decided several days before not to waste energy chastising myself. It took too much time and attention away from the learning experience. I hadn't been injured, and I was in no real danger; the incident was merely another object lesson in what not to do in a stress situation.

That was essentially what the expedition was designed to do anyway: let me learn outdoor skills and judgment through instruction, experimentation, repetition—and plenty of mistakes.

No one liked the daily routine of breaking camp, moving ahead a few miles, and staking camp again, and again, and again. But it was important for our large group to move frequently and avoid leaving any permanent signs on the area. We learned a lot about dispersed hiking and low-impact camping techniques—the essential skills of wilderness conservation.

One snowfall would cover any trace of our presence, and the continual precipitation in Yellowstone speeded up the process. Snow fell even when the sun was shining—lightly, lightly, dry and soft, shaken off in an instant. If I didn't remember the exact location of my gear outside the tent, I risked losing it completely.

We didn't wash dishes with soap, because of its polluting potential, and we carried no toilet paper, since we'd have to transport it "used" to the roadhead. Snow served as a satisfactory substitute.

Our daily winter food ration provided an astounding two and a half pounds of dry food per person, mostly pastas, grains, and cheese. Its caloric content averaged about 4,500. Calories generate heat, and we were instructed to eat as much and as often as we wanted. Nuts, chocolates, and cheese were carried in a pack side-pouch as trail food, which we gobbled at each rest break. Boiled casseroles provided the main course each evening.

Our comfort on the expeditions was due in large part to our gear. We looked like astronauts ready for a space voyage to Jupiter. Every piece of clothing was loose and unrestrictive, right down to the men's boxer shorts I'd been required to wear to insure complete freedom of movement. It was like wearing pajamas all the time, and I loved it. Except for fingers and toes, I was never cold.

The looseness also did more than prevent cold feet and possible frostbite. It blurred the boundary between me and the snow. Sitting in it, I couldn't tell where I stopped and it started.

I liked the simplicity of it all. It was natural. As the days passed I became more comfortable with the necessary daily rituals of housekeeping, and started noticing signs of life in the mountains I'd been too preoccupied to notice before.

Animal tracks patterned the snow everywhere, and we learned to identify them. I spotted an elk's lair. Eagles, ravens, and hawks often soared above, and I began to note differences in wing spans and coloring. Minnows darted about in the tepid water of streams heated by thermal springs where we bathed and felt at peace with ourselves. Venus announced the dusk each afternoon, and the lodgepoles constantly creaked and squeaked in a rhythm set by the breeze. We traveled through their sparse shade, and crossed the Firehole River. Trudged up and fell down Grant's Pass, and walked across the warm, bare Shoshone Geyser Basin. We stooped down close to the microscopic world of the hot springs, and stood back in admiration at the geysers' shouting.

Don Webber, the third instructor, observed my increasing interest in the world around me, and it pleased him as much as it pleased me. "One of my main goals is to break down the student's image of himself as separate from the natural environment," he explained, "but I realize that he must first be comfortable in the wilderness before he can begin to learn from it."

Each of us relaxed and learned at his own tempo. My cooking partner, Myles, got past the comfort factor faster than I did because he'd learned how to camp on an earlier NOLS course the previous summer. He also knew how to "read the woods," because he is a wildlife biologist. But I sometimes wondered about his choice of interests.

"I've found a mink latrine," he shouted enthusiastically one evening, returning from a private expedition before dinner. "Hundreds of specimens, a real gold mine." Thumbing through the pages of *Field Guide to Animal Tracks*, he carefully identified one. The next morning he found an otter dropping, and gleefully compared the two.

"Animal scats are really interesting," he explained to the group after one of our formal classes. "Oftentimes, the only evidence you find of an area's wildlife is scats and tracks in the snow. You can tell a lot about an animal from them. What it eats, what it is, and generally how it's getting along."

Each morning the call would ring out from a different snow kitchen: "Animal raid—Myles, come take a look." Our resident doctor of scatology would shuffle over to identify the tracks of the varmint who'd neatly gnawed

We dipped our cups in and made tea.

Soaking in a hot spring is equivalent to a free massage and psychological analysis combined.

through our nylon food bags and devoured Baco Bits and cheese. "Pine marten," Myles would say with an air of authority. One night a particularly ambitious commando patrol of martens dragged a frying pan full of frozen pizza dough to a stash under a fallen log. As we moved closer to the roadhead, some of us began to spot less timid martens. But as fate would have it, our own Sherlock Holmes never caught a glimpse of the rogues.

Myles was one of my environmental mentors, and he taught me much about Yellowstone's remarkably homeostatic hot springs ecosystems.

Armed with meat thermometers, litmus paper, peppermint-tea bags, and enameled metal cups, Myles, Mike Schendel, Paul Chesley, and I skied up to the Shoshone Geyser Basin from camp.

Mike was our group's best cook; his pinches and palmfuls of chili powder, garlic, mustard, curry powder, and oregano elevated macaroni and cheese to truly *haute cuisine.* On a previous foray near the Lone Star geyser, Mike, whose hobby is taxidermy, had discovered hundreds of scalded bare bones on the bottom of a string of thermal pools.

Leaving our skis at the edge of the basin, we trudged from spring to spring, cautiously testing the geyserite surface before walking up to the edge. Our meat thermometers registered between "Ham" and "Well Done Pork" when we placed them into the bubbling source pools. If the litmus paper indicated a mildly alkaline spring, we dipped our cups in and made tea.

Hot springs are surely the prototype for watercolor paintings. A muted wash of earth colors melts away a frame of white snow around their pools and channels.

"Colors in hot springs are created by plant and animal communities that thrive in the mineral water," Myles explained. Because springs flow at a constant rate and temperature throughout the year, life continues at the same pace in winter. Close to a pool's source, some kinds of bacteria actually thrive in boiling water. As it cools, flowing away from the source, the types of algae and bacteria change. This creates a progression of color from white at the hottest point, through shades of yellow, orange, red, blue-green, to dark green in the channels.

Mist rising from the springs and occasional geysers coated nearby trees with rime ice in intricate textures, and softened the sunlight as it scorched through to us. Clouds charged overhead at a clip that looked artificial, like film footage played at fast speed.

Steam enshrouded our movements, and the wind whipped us all day. But we stayed in the basin, looking down, down into the hundred thermal pools that gurgled and sizzled and silently overflowed onto the warm earth.

A few days later, Paul and Myles and I skied silently through a thick lodgepole forest, following Mike's track, which was already fading under the new-fallen snow. He had left camp alone several hours before to try to locate the spring. It reportedly flowed into a stream; we hoped to be able to bathe there without scalding ourselves or damaging the algae in it.

It was the last layover day before we skied out of Yellowstone. Snow fell at three inches an hour, and stuck to the rough bark of the vertical trunks. Occasional gusts of wind pushed localized blizzards across my path, making the branches above dump their accumulations of snow, which burst like water balloons on top of me. My skis glided through the powder like kayaks in white water. I was free of my pack, and felt wonderful.

The track broke out of the forest and continued on the far side of an open meadow. Finally, through the trees, we saw steam, rising thinly.

Mike was just dressing, his balding head scarlet and shining, his beard newly combed and clean. He had soaked for an hour, and now was off in search of the source spring.

I carefully peeled off my layers of clothing, and stacked them in order under a tree. Then I dashed to the bank and waded into the knee-deep water. My skin burned as I sat down in it. And my mind cleared. Soaking in a hot spring is equivalent to a free massage and psychological analysis combined.

Lying on my belly, I peered out of the water and at the level of my nose watched a spider pursue a tiny, specially adapted hot-springs fly from leaf to leaf in the lush emerald strip that grew between the stream and the snowbank. Everything was very small: the plants, the spider, and the fly. But they were very much alive.

"Alive, they're alive," I wanted to shout to my companions. "They're alive, I'm alive.... We're all alive—and that's the prize."

I stared at the tiny life on the stream bank for a few more moments, and then back at my companions. In that instant we were all connected through my consciousness as one body. Then I turned over and floated silent and still, letting the snowflakes wet my face.

Later, as I stood dressing on the bank, I felt the sharp sensation of chill on my steaming skin. But I wasn't cold, or afraid of the snow that was falling on me. I layered my garments slowly, relishing the pure frozen air—and my prize. ●

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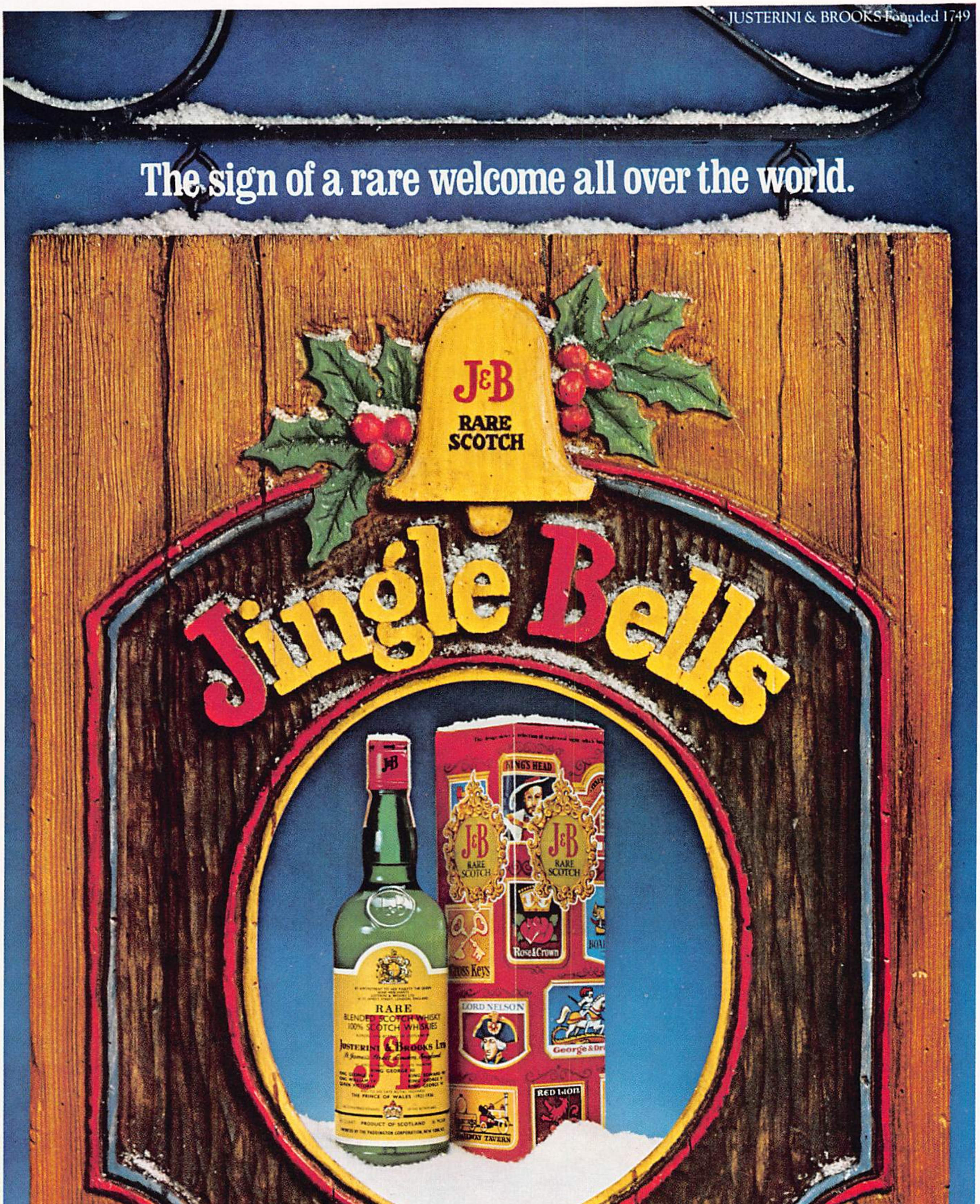

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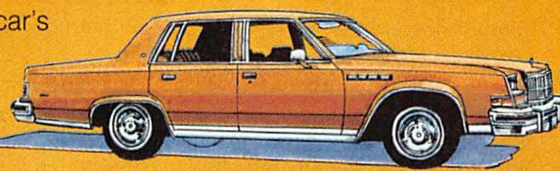
of only a few years ago. Thus making it lithe and nimble. Easy to park. And it conserves fuel rather effectively.

In fact, according to the EPA, an Electra with standard 350- cu.-in. (5.7 litre) engine and automatic transmission got an estimated 22 mpg in the highway test, and 15 in the city, for a combined figure of 18 mpg. (Remember, these are estimates. The mileage you get may vary depending on how and where you drive, the car's condition and how it's equipped. And EPA estimates are lower in California.) Electra models are equipped with GM-built engines supplied by various divisions. See your dealer for details.

Yet, for all its trim dimensions outside, the interior of Electra continues to be an absolutely astounding place. With such wonders as a quartz-controlled clock, and power windows, standard. Plus lots of head room, leg room, trunk room for you, your passengers and your belongings.



Electra.
22 mpg highway. 15 mpg city;
Another engineering marvel.

The 1978 Buick Electra. The kind of elegance and élan Buick owners have always demanded. Combined with the kind of engineering the times demand. A rather neat trick, if we do say so ourselves.

BUICK

A little science. A little magic.

UNCLE AHMAD

A story

ANNE TYLER

He hadn't been in the United States an hour when he telephoned. "I have a collect call for anyone," the operator said, "from Mr. Ahmad Ardavi. Will you accept—"

"Hello? Hello?" Uncle Ahmad shouted. "This is Ahmad! Ahmad is here!"

Elizabeth was the one who answered, and she wanted to get her husband but Uncle Ahmad didn't give her a chance. "I'm coming!" he shouted. "I've landed from Iran! I'm taking the train to Baltimore! Hassan is going to meet me?"

"Well, yes, surely, but don't you want to—"

"The ten p.m. train. Tell Hassan, Ahmad is on his way. So long! Bye bye!"

He hung up. There was a silence.

"Will you accept the charges?" the operator asked.

He was the black sheep—the gayest, the loudest, the wickedest, a frequenter of wrestling gyms and gambling joints, a heavy drinker in a Muslim family, an opium smoker, twice divorced, the kind of man who makes his friends' wives tighten their lips and shake their heads. Elizabeth had never met him but she felt she knew him well; she'd heard him discussed so often among visiting aunts and nieces. All the women in the family disapproved of him.

The men in the family adored him.

Her husband stood in front of the bedroom mirror and buttoned his shaggy sweater. Usually he never looked in the mirror. Even shaving, his eyes were focused on the reflection of the razor. But for Uncle Ahmad's sake he stood in front of the mirror with a sober, considering gaze, as if summing himself up. Elizabeth watched at his right, her thumbs hooked through the belt loops of her jeans. She wouldn't be meeting the train because it was after the children's bedtime. And anyway, she supposed that Hassan and his uncle would like a little time on their own. She saw herself as a blurry blond liquid in the glass, hovering by Hassan's darker, more solid substance. He combed his hair, and smoothed his mustache with one cupped hand. "I hope you won't mind his manners," he said.

"Manners?"

"In good moods he eats rice with his fingers, sitting cross-legged on the floor."

"The children will love it," she said.

He didn't smile. He gathered objects from the bureau—billfold, keys, coins—and distributed them among his pockets. "Back home," he said, frowning at a ticket stub, "the women keep telling him to use a spoon, lower his voice, show some consideration. They say he upsets their households."

"I won't mind," she told him.

"Once he brought Aunt Eshi a take-home pizza during Ramadan."

"I don't even celebrate Ramadan."

"She said that she was fasting so he sat down and ate it himself."

"Believe me," Elizabeth said, "everything will go all right."

"A *sausage* pizza," said Hassan. He laughed. His face grew diamond-shaped, lighter, happier. For a moment, she could see how he must have looked as a child.

Uncle Ahmad turned out to be seven feet tall, lean, massively built, yellow as an onion. He had a handsome, leathery face and iron-gray sideburns; on top, he was perfectly bald. In fact, he reminded Elizabeth of a suntanned Mr. Clean. He even stood like Mr. Clean, when she opened the door to him—arms folded across his chest, feet wide apart between stacks of luggage. At first he just smiled down at her, with his golden, curiously Tartar eyes veiled and slitted; then he bellowed "Elizabeth!" and flung out his arms and hugged her. He smelled of some cologne that was spicy and sharp; it prickled her nose like a sneeze. His chest was hard as bricks. She felt encased, protected. But he was not, after all, seven feet tall. It was only his way of standing, maybe, or his crashing voice or his assurance—his *presence.* She could easily look over his shoulder and see, behind him, Hassan coming up the sidewalk with three more pieces of luggage.

Once inside the house, Uncle Ahmad walked through the living room, rubbing his hands together and looking all around him. It was early spring, and cool; Elizabeth had lit a fire in the fireplace. "Nice, very nice," said Uncle Ahmad. "How much this house costs? I'll take three." He laughed, and then frowned at Elizabeth. "Where are the children?" he asked.

"They've gone to bed."

"What! Now?" He shot back a cuff (all his gestures were a mile wide) and looked at a huge gold watch. "Ten-

Uncle Ahmad turned out to be seven feet tall, lean, massively built, yellow as an onion. He reminded Elizabeth of a sun-tanned Mr. Clean.

ANNE TYLER's novels include *Celestial Navigation*, *Searching for Caleb*, and most recently *Earthly Possessions*. One of her short fictions is included in *The Best American Short Stories of 1977*.

Charles Santore

ILLUSTRATED BY CHARLES SANTORE

thirty!" he said. "Why you didn't let them wait for Uncle Ahmad?"

Elizabeth felt she'd already failed his test; she'd proved as fussy as any other woman. "Well," she said, "maybe I could see if they're . . ."

But he said, "In the morning, then," and patted her shoulder. "Wait! I'm forgetting." He sprang to his biggest suitcase, opened it, and pulled out tissue-wrapped boxes. "See what I brought you," he told her. "Pistachios, baklava . . ." He piled them in her arms. The spicy smell of his cologne advanced and retreated, advanced and retreated. He gave Hassan a blue silk tie. Then he took Hassan's head in his hands and kissed him on both cheeks. "Ah, Hassan," he said. "I'm a lonely man. It's good to see you." And he turned to Elizabeth and said, "At home, I've lost all my friends. No one likes me."

"Oh, surely that can't be true," said Elizabeth.

He looked interested. "Why not?" he asked her.

"Well, I mean . . ."

"I'm too much for them, I'm too much trouble. My friends say they want a rest. They say, 'Go on, Ahmad, I'm tired, I don't want to be bothered anymore. I want to sit here with my wife,' they say. Now I have no one left. Could you bring me a Scotch, please."

"Of course," Elizabeth said.

She went out to the kitchen and poured a large tumbler, remembering that he supposedly drank Scotch by the quart. When she returned, he and Hassan were settled on the rug in front of the fire. Uncle Ahmad had his shoes and socks off, his shirt half unbuttoned, and his trousers rolled up to the knees. His feet were very long and highly arched; his calves were ropy, muscular. He appeared to take up half the living room. "Ah!" he cried when he saw her, and he reached for her hand and guided her down beside him.

Uncle Ahmad had his shoes and socks off, his shirt half unbuttoned, and his trousers rolled up to the knees. He appeared to take up half the living room.

Then he drank the Scotch to the bottom, meanwhile encircling her with one arm. "Excellent," he said when he'd finished. He smiled at her, showing two rows of tobacco-stained, crumpled-looking teeth. "I'll have more in a minute, not just yet," he said. "It's bad to drink too much if you plan to smoke."

Elizabeth finally thought of the phrase to describe him: he was "larger than life." She rested, pleased, within the angle of his arm. She felt the house had grown fuller, somehow; her husband had a tousled, expansive look, and the living room was a tumult of tissue paper and open suitcases. Uncle Ahmad spoke at length, sometimes in Persian so she had to concentrate on his words. He was sick to death of Iran, he said. He'd had enough of those meager little people at home. He was only here now for a month, it was all the time he could spare from the oil fields, but next spring when he turned fifty he was taking an early retirement, gathering all his money and getting out. Maybe he would live in America. "Why not?" he said in English. "I'm a millionaire several times over. And the language is no problem; at work I deal with Americans every day. I'll come and live in Baltimore near you, Hassan, near you, Elizabeth—my two favorite nephews."

"We'd love it," they said.

Then he took out his billfold, and found the black wafer of opium that he'd boiled down at home for his journey. He and Hassan drew close together to smoke a chunk of it in a tobacco pipe lined with Reynolds wrap. Their faces turned calm and beautiful; their skin took on a lemony glow. And even Elizabeth, who never smoked anything, began to feel gently bemused by the charred-roses smell of the haze that drifted over the living room.

The children loved him. He took Jenny for rides on his shoulders; for Hilary, he opened Coke bottles with his teeth. He made peculiar cork-popping sounds and then looked all around the room: "Where it comes from? Eh? Where it comes from?" He shuffled cards to form bridges and twists and flying arcs, and then collapsed them into a deck again and threw back his head and laughed. His laugh could jar the house to its bones. The chains and medals on his gray-frizzed chest would jingle; his eyes would tilt and narrow. Jenny and Hilary were spellbound. They never thought he was funny, although he meant to be. They seemed to believe that he was some sort of genie. In the mornings their first question was, "Is Uncle Ahmad still here?"—as if he might have vanished in the night. They asked the same thing when they came home from school; they raced through the house to find him. "Where'd he go? Is he here?"

"Boo!" he would say, popping out, and immediately they took on the expectant, trustful look of children at a magic show, waiting to be dazzled.

But when he tired of playing he grew abrupt; he almost scared them. "Enough," he would say. He would drop to a chair, languidly raising one huge hand. "Enough, go away." And he would rest there, mournful and sulky-looking, with the corners of his mouth pulled down by two deep lines. "Ah, ah," he would tell the rug. He would pull out a Camel, light it with his slim gold lighter, hold it absently in those nicotine-stained fingers so burdened with massive gold-and-turquoise rings. Or he would take his amber prayer beads from his pocket and click them up and down—not idly, as other men did, but with a kind of knowing, scornful competence, two beads by two beads, and a careless flick when he reached the silk tassel at the end and started over, never once actually looking at the beads or appearing to realize that he held them. "Ah, Lizzie," he would say, stretching out his feet, "I'm an old man, old man . . ."

He called her Lizzie. She had never been called Lizzie in her life, never would have allowed it, but from Uncle Ahmad it seemed an honor. Everything he did was touched with some kind of exotic yellow light. Yellow, in fact was his color—the color of his skin, his eyes, his teeth, his buffed nails, his prayer beads, and his jewelry. Even his shirts were yellowish, most of them: ivory silk, no doubt expensive, blousing at the cuffs and waist and open nearly to his navel. He could have been a pirate or a riverboat gambler—anything at all. Elizabeth's friend Ada, coming to return a casserole, gaped at him once from the doorway and later asked, in a whisper, "Why is Yul Brynner sitting in your living room?"

And Elizabeth, newly rich, spread her hands and smiled and said, "Don't ask *me;* I guess he just likes it here."

He told Hassan that he felt life had cheated him. "What does it amount to?" he asked. (He said this in Persian, over the pipe, long after Elizabeth was in bed. Later Hassan would repeat it all to her, frowning, as if studying each word a second time before he passed it on.)

"What have I got out of it?" Uncle Ahmad asked. "I've had a hard lot, my childhood was wretched. You never knew your grandfather but he was a selfish, stingy man. All his wealth went for his own pleasures. He kept wives, women, he traveled through Europe picking up the latest ideas . . . but we were never even given the proper schooling. He wore an enormous coat made of some kind of rare white fur from Russia but we children were in rags. I tell you, Hassan, our family has always lived a life without supports. We don't sustain each other, we look only inward, we're all depressives . . . oh, if we could be the way I dream of! Upholding each other, giving courage, love, strength. But these Ardavis, it takes all the courage they have just to get through the day.

Elizabeth tried on one of his rings. It was big as a napkin ring and warm, almost hot.

"Your father had it better; he was the oldest, your grandfather's favorite. Not that he was any happier, poor creature. But me, I was always in disgrace. I don't know why. I'm a likable person, am I not? But he couldn't stand the sight of me. So I said, 'Ah well, wait and see, when I grow up I'll be rich, somehow. I won't want for anything, I won't have to ask a thing from anyone.' And that's what happened. I've done well, Hassan. And I did it on my own. I have drawers full of shirts I've never even worn yet. My shoes are made in Rome, my suits in London. Sometimes I buy an armload of jewelry and travel through Tehran making peace with the aunts. You think they don't give in then? They're glad of me, underneath. They have some need of me.

"But money, what is money? My first wife, Maryam . . . well, she was a youthful mistake, never mind. But then Pari! I bought her everything, gave her all she asked, new dresses every day of the year. When her clothes were ready to be laundered, she threw them out and bought new. But still, she wasn't satisfied. I couldn't so much as clean my teeth at the table; she found it offensive. '*I* paid for this table,' I told her. 'I paid for the meat that is stuck in my teeth, paid for the toothpick too. Do I have a right to clean my teeth, or not?' A woman like that takes the fun out of life, Hassan-jun.

"She turned mean and niggling, small-minded as all women do, in the end. Forever complaining, finding fault. She said I was too noisy, too uncouth, too self-centered. Then she started plucking her eyebrows and they got that puffy look. I said, 'Enough! I've had enough of women!' Oh, the odd one here and there, but still . . . and she's already ruined my son. Remember Jamal? He's a weakling, a girl, his mother wouldn't even let me teach him to wrestle. 'Oh, no, you'll hurt him, you're so rough, you think nothing of pushing people around . . .' Now he works in the Bank Melli, some sissy job, I never even see him. Is this what it amounts to? Is this all I'm getting?

"Ah, baba," he said, tugging his ear, "sometimes it seems to me that I've worn out my life before I've come to the end of it."

And he laughed, but then shook his head, and pulled down the corners of his mouth as he held a match to his pipe.

His cologne took over the house. The children carried it to school on their clothes, and their friends asked what that smell was. His clutter of cast-off shoes, crumpled cigarette packs, and paisley silk handkerchiefs mounted in every room. His laundry (ribbed underwear of navy and brown and other surprising colors) tinted everyone else's. He enveloped them all.

In the mornings he rose late, after Hassan and the children were gone, and he would lope down barefoot to the kitchen and make tea on the gas range. A gigantic splash of flame nearly obscured the little kettle. (Everything he did was so extravagant.) When Elizabeth came in he said, "Lizzie," and absently draped an arm across her shoulders. He wasn't himself till he'd had his tea—two or three glasses, which he drank while sucking a sugar cube behind his upper front teeth. Then gradually his energy collected and rose, at least enough for him to say, "Well! What we are planning to do today?"

Like a child, he had to be kept amused. And his favorite amusement was shopping. His life really began at ten a.m. when the stores opened.

At Hutzler's, or Stewart's, or Towson Plaza, he raced down the aisles collecting shirts and ties. He bought fifty-seven dollars' worth of men's toiletries. He barely stood still, rumbling with impatience, while a nervous salesman measured him for a suit. Then he was off again, tearing through the sweater department, choosing cardigans and turtlenecks, and after that a new set of suitcases to put them in. He reminded Elizabeth of those contest winners who are given sixty seconds to gather as many free groceries as possible.

Over lunch, at some McDonald's or drugstore counter, he checked off items on a long list of Persian squiggles. His hands were so large that his fountain pen seemed about to snap, and his rings got in the way. With one contemptuous stripping motion he wrung them all off; they clattered like hailstones across the paper. "Now," he said. "Shirts, cravats . . ." Elizabeth tried on one of the rings. It was big as a napkin ring and warm, almost hot.

"Where can I find a raincoat like Hassan's?" he asked. "I want one."

"Oh . . . Hutzler's, maybe." She felt suddenly tired. It seemed too much trouble to eat. "Tell me," she said, "don't they have clothes in Iran? Are they too expensive, or what?"

"Eh?" he said absently. "No, no, we have plenty, but I want American clothes. I want a coat like Hassan's. I want all Hassan owns, I want it all."

He laughed. The other customers turned and stared, with the same sort of hopeful expression that the children wore in his presence.

After lunch, they often went to the dimestore. He had a weakness for ingenious utensils—like Elizabeth's perforated spoon for making tea. He bought three of those. And three Buttoneers for attaching buttons without thread, three Trac II razors, three adhesive-backed telephone pencils. He paid with fistfuls of ten-dollar bills whose supply seemed inexhaustible. Or sometimes he signed a traveler's check—his signature in English, "Ahmad Ardavi," surprisingly small and crooked.

His cologne took over the house. His clutter of cast-off shoes, crumpled cigarette packs, and paisley silk handkerchiefs mounted in every room. He enveloped them all.

Then at two or two-thirty, he would suddenly lose interest; he would seem to deflate. "We'll go," he would tell her. They made their way to the car, whose back windows were a mass of packages. Uncle Ahmad limped heavily, like a returning soldier. Settling in the car, he would sigh, "Lizzie, Lizzie, Lizzie," and allow himself to be chauffeured home in silence, trailing a gold-weighted hand out the window.

Once when they reached the house there was a department store brochure lying on the doorstep, with a man's bulky-knit sweater pictured on the cover. "Aha!" said Uncle Ahmad, peering down at it. *"That's* what I want! See that? I want it in beige."

"Uncle Ahmad," said Elizabeth. "You have it."

"I do?"

"You bought it last week, for forty dollars. You've got everything. What more do you need?"

She was annoyed, and her voice clearly showed it, but Uncle Ahmad didn't take offense. In fact, he seemed delighted. "You're right," he said. "I'm a greedy man. I want it all. Isn't that so?" And he flung back his head and laughed. "I want! I want! I want!" he said.

To Elizabeth, his mouth looked like a cavern, and she couldn't believe the number of packages in his great, long, sinewy arms.

Uncle Ahmad grew restless and called up all the relatives in America. He got them from Hassan's address book. Elizabeth thought he was having his afternoon opium but instead he was sitting on her bed dialing Chicago, Boston, and Minneapolis on the upstairs extension. When she came in with a stack of fresh sheets she found him there, talking Persian. "No, baba, come, there's lots of room, what's life without you to share it?" Elizabeth listened, leaning in the doorframe. She noticed the leather address book open on his knee. No telling how many people he had called before this one. There were so many Ardavis getting their education in the States these days that they could have formed a school of their own. When he'd hung up she said, "Uncle Ahmad, who was that?"

"Your dear cousin Kurosh," he said. "It's been much too long Hassan hasn't seen him."

But he looked uncomfortable, and when Elizabeth went on standing there he scratched his head, thought a moment, and finally closed the address book and rose. "I'll just go have a little smoke," he told her.

In the evening, when Hassan came home, Uncle Ahmad told him he'd invited a few guests for the weekend.

"You did what?" Hassan said.

"Just close family, Hassan-jun."

"But that could be two hundred people!"

"Dear one," said Uncle Ahmad, "what's wrong with a little party now and then? You're too quiet here. I'm a man, Hassan, I need fun, excitement, I need *life!"* And he flung his arms wide. "I am not the kind of person who can drag about on his own all the time," he said.

"Phone them," said Hassan.

"Eh?"

"Telephone them. Uninvite them."

"Hassan! I can't do that."

"You think we're back home?" Hassan asked. "You think we're in Tehran with twenty servants to make the beds and cook the rice? If you want to see them, go there. Or talk to us first, invite one at a time. Elizabeth can't be expected to manage without notice."

Uncle Ahmad lowered his arms and looked at Elizabeth. He waited. Now was the moment, she knew, for her to step forward and say that of course she could manage, let him have his party; she wasn't one of his niggling female relatives. But she didn't, though she suspected that even Hassan was hoping she would. She just sat quiet and watched the children's card game as if none of this had anything to do with her.

Then Uncle Ahmad said, "Very well, Hassan," and went away to the phone. They heard him dial a number and speak; and then another number, and another . . . "How many people *were* there?" asked Hassan.

"I don't know," Elizabeth said.

"The phone bill alone . . . you have to watch him more closely, Elizabeth."

"How can I? As it is I'm buying his clothes, brewing his tea, following after his opium pipe with a can of Glade . . . I'd have to put him on a leash."

"Yes, well," said Hassan, and he sank into a chair and

He walked on out, leaving his smell of spice and burnt flowers, leaving the house somehow bigger than before, and emptier, as if he had taken more than just himself.

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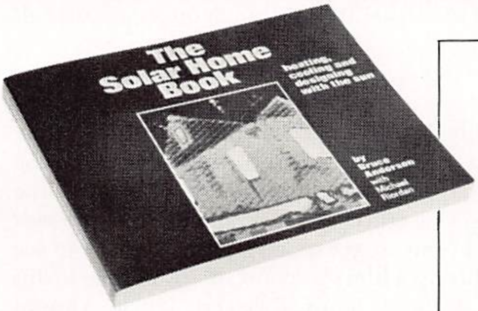

The Solar Home Book

by Bruce Anderson
with Michael Riordan

Whether you own a home, are planning on a home or just want to save money on heating *and* cooling, you should read this book. Informative, easy to read, abundantly illustrated, this 297 page book is the definitive work on heating, cooling and designing with the sun.

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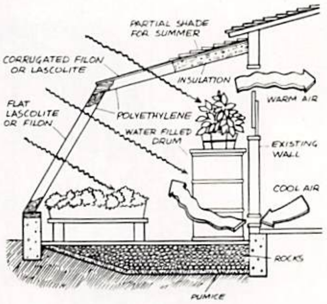

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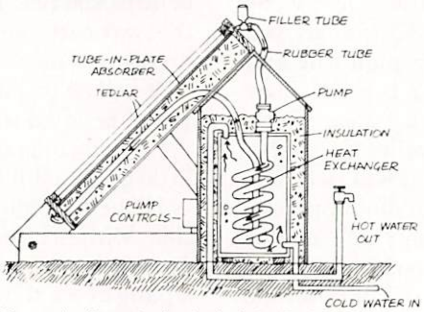

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Solar designer Bruce Anderson is president of his own environmental consulting firm which has designed or consulted on some three dozen solar homes across the country. He has testified before Congress on residential users of solar energy, has written two widely used books on the subject, and is executive editor of SOLAR AGE MAGAZINE.

Michael Riordan is a former research associate at Stanford University. Now a full-time writer, researcher and publishing executive, he is currently architecture editor for the revised ENERGY PRIMER and is currently working on a book of his own.

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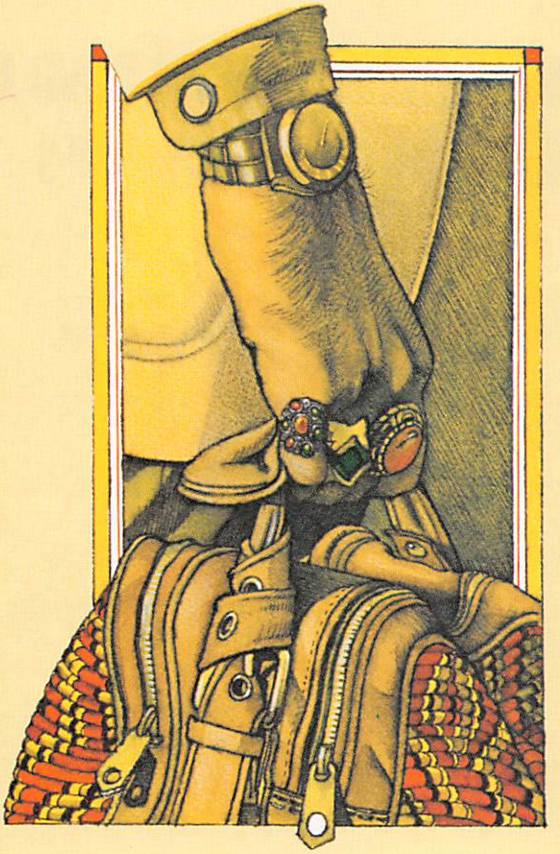

frowned into space. "The thing is, I always liked him so much."

"Well, of course," said Elizabeth.

"He was my favorite relative."

"Of course, Hassan, he's wonderful."

"But now I don't know," said Hassan. "It's difficult."

And he went on frowning into space, gently shaking his head.

Uncle Ahmad did uninvite everyone he could think of, but he forgot about two people—Kurosh and a second cousin by marriage named Hamid. Or else he overlooked them on purpose. At any rate, Kurosh arrived on Saturday afternoon with a pregnant Iranian wife and two crying babies, and Hamid wasn't far behind. They had to be supplied with makeshift beds, since Uncle Ahmad had the only guest room. They had to be given a steady stream of tea and Scotch, and mounds of rice. The men smoked their pipe and grew serene and philosophical, but the babies went on crying and Kurosh's wife seemed very unhappy. She said she'd been married by proxy; Kurosh had been in New Jersey and she in Tehran for the wedding, which was a very large affair with the bride all in white and the groom only a tinted photograph on the table next to the gifts. She wished he were *still* a tinted photograph, she said. She sighed and rubbed her abdomen, which was straining her embroidered velvet tunic.

Squinting against the smoke, adrift in a sea of pistachio shells, Elizabeth reminded herself that not everyone could lay claim to such a colorful family. Most of her friends had married Americans. Their in-laws were unremarkable. Their husbands had perhaps a couple of dull sisters, a few pallid nieces and nephews, a dowdy mother in a flowered hat. She imagined the mother arriving for Sunday dinner after church, bringing Peanuts books for the grandchildren. She'd be wearing short white gloves and an Orlon double-knit dress; her face would be plain, sweet, pocketed with homely wrinkles. A sad little ache started up in Elizabeth's chest.

"Ah, Lizzie-jun," said Uncle Ahmad, with his Tartar eyes alight, "isn't this the true meaning of life? Food and drink and a pipe to smoke, and your dear ones gathered all around?"

There was only a little ice cream in the bottom of the carton, and she stretched it to fill two bowls for the girls. It was Friday night and she still hadn't found the time to do this week's grocery shopping. She set the bowls on the table and went to get spoons, and returned to see Uncle Ahmad lifting Hilary's scoop of ice cream in his fingers. "Uncle *Ahmad!*" Jenny shrieked. Uncle Ahmad laughed, holding his mouth wide open, his lower jaw jutting forward, his fist dripping ice cream across the tablecloth. Elizabeth rapped a spoon on a glass, sharply, like an after-dinner speaker. "Put it back," she said.

He turned and stared, his mouth still open, his fist still dripping, the laughter fading. Hassan lowered the evening paper.

"Put it back in the bowl," she said.

He looked at Hassan. Hassan nodded. "Back," he said.

Slowly, Uncle Ahmad opened his fist and let the ice cream fall into the bowl.

"Well," he said, tucking his ticket in his coat pocket, "I think I have everything."

"We hate to see you go," said Elizabeth.

She was dying to see him go. She'd been waiting for this the whole month, it seemed now. She couldn't believe she'd ever welcomed his coming, or willingly padded across the floor to him with his tumblers of Scotch. But there was only another half minute to endure, so she could smile and say, "I hope you have an easy trip."

"Thank you, Elizabeth," said Uncle Ahmad, and he bent to kiss her. His face felt fine-grained and hard. But this was early morning, not his best time, and when she drew away she thought he had a shriveled, skull-like look. The yellow of his skin was brassy, almost curry-colored. When he lifted the children, a grunt escaped him.

"You'll come and visit, yes?" he asked them. "My two little gypsies. I'll buy you gypsy earrings."

He held a child in the crook of each arm. Standing like that, with his feet planted wide, he suddenly became the man she'd first met—gigantic, powerful, generous. She felt a pang at the thought of losing him. And she guessed from his averted gaze that he wouldn't be coming back. He lowered the children gently to the floor. He slapped his pockets and told Hassan, "So. I'm ready, I think."

Then at the door he turned and called, "Okay! Ahmad is going! So long! Bye bye!"

And he walked on out, leaving his smell of spice and burnt flowers, leaving the house somehow bigger than before, and emptier, as if he had taken more than just himself. He might, Elizabeth thought, have carried off something of theirs as well. She had never known till now that people who are larger than life become that way by consuming chunks of other people's lives, so they are missed forever afterward like an arm, or a leg, or a piece of a heart.

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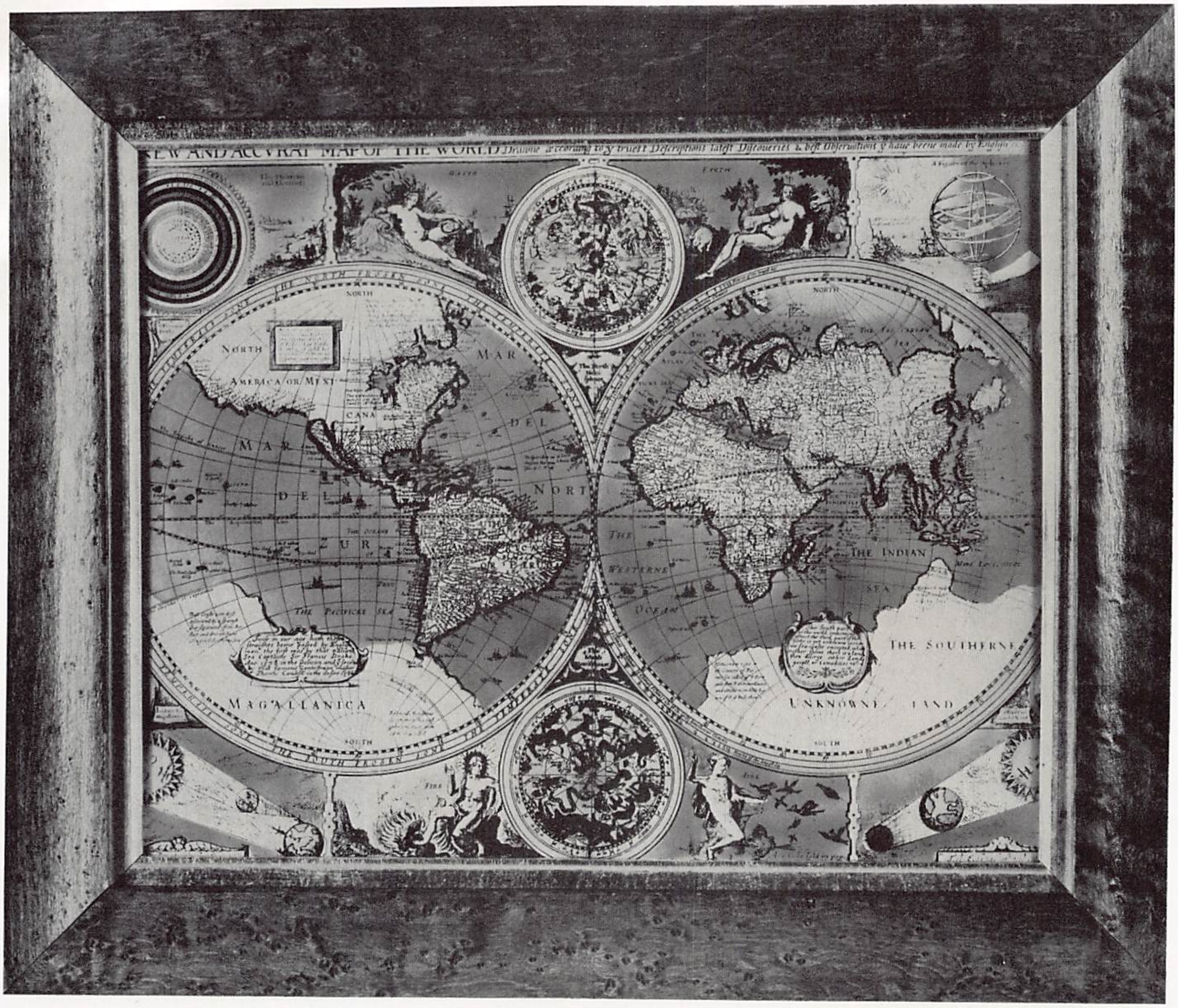
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BOOKS

The Prince of Fantasists, J.R.R. Tolkien

The Silmarillion
By J. R. R. Tolkien
Houghton Mifflin Co.
307 pp. $10.95

RICHARD ADAMS

O mighty Tolkien! Prince of fantasists! How shall we find words rightly to praise thy nobility of conception, faultless consistency of narrative, and superb fecundity of invention? I have just been reveling in one of the greatest literary privileges and experiences of my life: to be among the first, outside the departed author's circle, to read *The Silmarillion.* Don't waste time reading the rest of this review. Go straight out and buy it, NOW!

Well, that's cleared the place a bit. Anyone still here? All right, I'll go on, if you insist. When I was asked to review *The Silmarillion,* I thought, "Ah, barrel-scraping, no doubt." You know how it is. When an author dies with a great success behind him, people in the book game ask, "Did he write anything else we could publish, while he's still hot property?" Usually these are dredged-up bits and pieces, well below the standard of the great work. *The Silmarillion* is not. It is, in my view, greater and more satisfying than both *The Hobbit* and *The Lord of the Rings.*

But whether or not I am right in this, there is no doubt whatever about my next point. Those who love *The Lord of the Rings,* who are proud to boast that they know Tolkien's world from A to Z ("Ask me five questions, then I'll ask you five"; "How many casualties did the Ents suffer in their attack on Orthanc?"; "How did Boromir die?"; "Where was Cirith Ungol?"), have now got to start again, FROM SCRATCH. Yes, from scratch! I'll explain.

SNOWDON/CAMERA PRESS

J. R. R. Tolkien.

Tolkien's fantasy world began to take shape in his mind toward the end of the second decade of this century—that is to say, during his late 20s. The entire fantasy was of vast scope, embracing an entire mythology of creation, good and evil, ethnic development, epic struggle, sin, fall, and redemption. Upon this he meditated continually for the remaining 50 or so years of his life (1892-1973), musing, rewriting, enriching, bringing one thing into line with another. During the thirties he wrote *The Hobbit.* During the forties he wrote the much longer and more powerful *Lord of the Rings.* Now get this, citizens! The entire *Hobbit* and *Lord of the Rings* deal only with a single heroic episode occurring at the end of the Third Age and summarized in just two pages at the close of *The Silmarillion*'s 290 pages. The remainder of *The Silmarillion,* even nobler and more compelling than *The Lord of the Rings,* covers the whole of the rest of the fantasy, from the creation of the world to the end of the history of the Eldar or Elven folk of the Great Journey.

The form of *The Silmarillion* is not a romantic novel, like its forerunners, but a sort of Elvish Bible. The general "feel" most resembles that of the Old Testament. Dialogue and individual character have about the same degree of importance that they have in the Old Testament—that is to say, characters appear and vanish, subordinate to history and narrative flow as they are not in *Lord of the Rings.* That

RICHARD ADAMS is the author of *Watership Down* and, most recently, *Shardik.*

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subordination goes, too, for descriptions of natural scenery, to my mind the best thing in *Lord of the Rings*. The Elvish Bible comprises five "books": Ainulindalë (eight pages), Valaquenta (eight pages), Quenta Silmarillion (231 pages), Akallabêth (24 pages), and Of the Rings of Power and the Third Age (20 pages). There are two maps, six tables of Elvish genealogy, a note on pronunciation, and an index of names. I have been very seriously hindered indeed (I'm hopping mad, actually) because my proof copy lacks the most important map, the index of names, and the appendix on Quenya and Sindarin. This is crippling.

The style is most like Malory, the greatest fantasist of all—a kind of simple, stately, half-archaic prose, eminently clear and readable. Like Malory too is the flow and the feeling that a huge plan is being worked out. But it is distinctly biblical also. "Now the Valar took to themselves shape and hue; and because they were drawn into the World by love of the Children of Ilúvatar, for whom they hoped, they took shape after that manner which they had beheld in the vision of Ilúvatar, save only in majesty and splendour." Some critics may feel this is eclectic. I can imagine no other style or treatment appropriate to such a theme.

"Ainulindalë" begins with the Creation, by "Eru, the One, who in Arda is called Ilúvatar; and he made first the Ainur, the Holy Ones, that were the offspring of his thought." Tolkien then introduces the beautiful concept of Ilúvatar, imparting to the Ainur, initially, musical themes, which they sing before him in harmony. "The echo of the music went out into the Void, and it was not void." From this creation followed all else. Their harmony became visible reality. But one of the Ainur, Melkor (later to become Morgoth, Sauron's boss), through pride introduced his own discordance, and this evil informs the whole of the rest of the epic.

I cannot here summarize this enormous, yet admirably economical, work. To the four Ainur (archangels? No, rather the four elements of alchemy) were added the Valar, a pantheon not unlike the Olympians (one of them, *Ring* buffs, was Elbereth), and the Maiar, spirits "of the same order but of less degree." The Elvish peoples followed, and the first Orcs were unhappy, lost Elves whom Melkor Morgoth captured, corrupted, and bred from, for his wicked purposes. Shelob's ancestor appears too, an appalling creature called Ungoliant, worse than Shelob, who devours light. An early Elvish hero, Feanor, forges the three Silmarils, and then pursues his terrible and tragic destiny in the hopeless quest for their recovery. (This made me cry.)

It is said of generals that often one can discern, from their style of generalship, in which arm they served as junior officers. Napoleon was a gunner, Lee a sapper, Haig a cavalryman, Montgomery of the infantry. Composers too—Beethoven was a pianist, Elgar a violinist, and so on. Fantasists are often graduates—but of what? Lewis Carroll was a philosopher and mathematician, T. H. White an expert on hawking (and, for what it's worth, I myself graduated in modern history). Tolkien was, of course, a philologist, and perhaps the finest feature of *The Silmarillion* is his virtually continuous invention of beautiful, euphonious names. Here are a few: Carcharoth, Erchamion, Daeron the minstrel, Orome, Dorthonion, Eriador, Varda, Sirion, the Noldor, Tulkas, Huor, and Idril Celebrindal. Many characters and places have two and sometimes even three names each. ("To the west of Thangorodrim lay Hisilome, the Land of Mist; Hithlum it became in the tongue of the Sindar.") Tolkien here is "doing his thing," if you like it. Personally, I could unravel this stuff with delight all day and all night.

Like the Brontës, Edward Lear, or Walter de la Mare, Tolkien was a true fantasist. He didn't just do his creative imagining on the side. He lived it, he breathed it. He preferred it, much of the time, to real life, which was often difficult for him. (He had had an unhappy, bereaved childhood and a terrible time in Flanders.) But it is redolent, too, of the other things that were himself—his devout, uncomplicated, unquestioning Roman Catholicism (all through his work people become "baddies" to the precise extent that they are self-seeking and unorthodox—Boromir, Saruman, Gollum, Thorin Oakenshield); his fondness for a bit of good grub; his genuine hatred of and freedom from fascination with cruelty. In strongest contrast, perhaps, to present-day tastes is his unquestioned assumption (widespread but by no means universal in his day) that sex was something to be entirely omitted from fantasy.

Here, I think, we have a genuine weakness—the Achilles' heel of this great fantasist. For a fantasy is valid, effective, and successful to the extent that it mirrors and reproduces life itself. But it remains very difficult to imagine the sex life of the Hobbits. It has been, so to speak, excluded from the total conception, and to this extent they stand malformed and unconvincing. By contrast, the pirates in *Treasure Island* are envisaged by Stevenson in the round. Tolkien's fantasy, like Kenneth Grahame's, limps a little with this, as it were, deformity from birth, but both are, I believe, secure despite it.

And lastly, what wonderful, disturbing things Tolkien is able to *imply* with many of his concepts! I single out just one—Gollum. Who is he—this dreadful, untrustworthy, contemptible, pitiable, neurotic, socially unacceptable, stinking bounder, who is nevertheless in sole possession of something which makes him totally indispensable to all us ordinary folk if we are to win through? Philoctetes? Beethoven? Van Gogh? Or, perhaps, the hippie up the road? I often think about Gollum. I often believe I'm meeting him—

Oh, you're all back with copies of *The Silmarillion*? Splendid! I'll leave you to it.

The Jazz Odyssey of "Fatha" Hines

The World of Earl Hines
By Stanley Dance
Charles Scribner's Sons
368 pp. $14.95

NAT HENTOFF

There used to be a myth that jazz musicians were inarticulate. Through their instruments, they could indeed tell wondrous tales. But, except for certain passing idioms ("dig," "hip," "like, man, that's a *bad* cat"), jazz players were not thought capable of verbalizing about music or about their own lives.

Having grown up among jazzmen, I knew this for a canard. In 1955, to definitively disprove the notion that these musicians could barely make themselves understood off-stand, Nat Shapiro and I put together a book, *Hear Me Talkin' to Ya*, a history of the music as told by the creators themselves. We simply interviewed, taped, and edited, inserting no words of our own for they were not in the least needed.

Since then, there has been a growing number of jazz oral histories based on tapes of musicians' reminiscences. Yet many key odysseys remain to be related. Finally, one of them, *The World of Earl Hines*, has been published. The book is both a full-scale autobiography of a pervasively influential pianist (still resoundingly active at 71) and a flavorsome socio-economic history of more than a half century of the jazz life, as experienced by Hines while he led a succession of bands featuring scores of pivotal musicians, up to and including Dizzy Gillespie and Charlie Parker.

In addition to rendering numerous musical epiphanies of associates like Louis Armstrong and the young Sarah Vaughan, *The World of Earl Hines* illuminates the jazz life through Hines's reminiscences, such as his account of musicians' working conditions in hood-controlled Chicago nightclubs in the 1920s. The Windy City thugs were a fearful and unpredictable lot, to be sure; but Hines is impelled to add of Al Capone, at least, that he "used to run a restaurant where poor people could get free meals twenty-four hours a day, and he took over real estate where these same people could move in and live."

Hines also describes what it was like for a black band traveling in the South, and for that matter in the North, until not so long ago. The anger remains, but there is much sardonic wit as he delights in replaying the ways certain musicians used to score unexpected points as "freedom riders" before that term was invented. Whatever the range of incident and

NAT HENTOFF is on the staffs of *The New Yorker* and the *Village Voice*.

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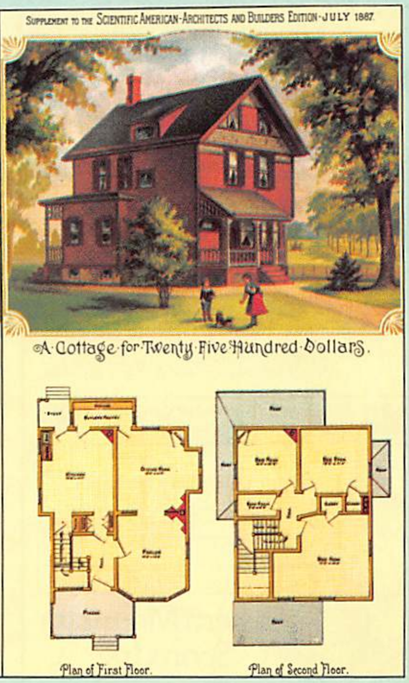
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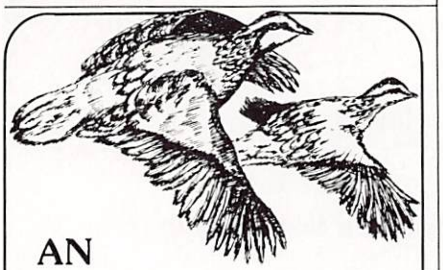

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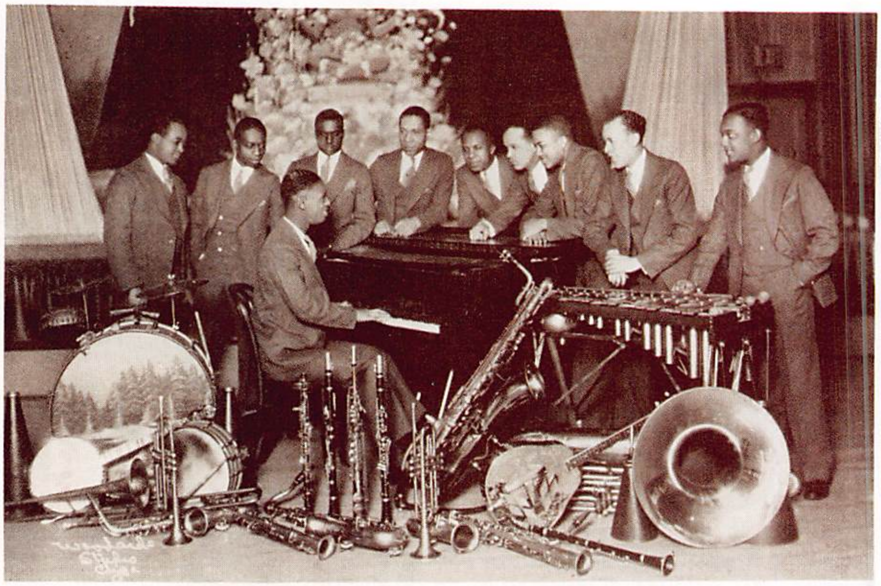

Earl Hines and orchestra at Chicago's Grand Terrace, circa *1928*

FREDERIC RAMSEY JR.

character—from shrewdly affectionate portraits of Fats Waller and Art Tatum to an analysis of the curse of the working musician, the club owner—Hines lives up to Dizzy Gillespie's description of him as a man of authentic "class." He always set tough standards for himself and his sidemen. And so too, as a chronicler of his life and times, Hines clearly has worked hard to get it all in reasonably judicious perspective, without euphemism or evasion. The telling, it should be emphasized, is as easeful as a long talk in an after-hours joint.

The orchestrator of *The World of Earl Hines* is Stanley Dance, an exceptionally conscientious jazz historian (who has already added greatly to our knowledge of Duke Ellington). Along with enabling Hines to take his first extended verbal solo, Dance has interviewed a broad spectrum of musical associates. Their individual sections serve as revealing counterpoint to the Hines narrative, often—as in Dizzy Gillespie's vividly absorbing monologue—extending beyond it. Also included are a chronology, bibliography, and discography, as well as 146 photographs, many of them from Hines's own collection and never before published.

Even for those with limited interest in jazz, this is a freshly instructive guide to certain aspects of American cultural and racial history that so far are unknown to most academicians, and therefore cannot be found in *their* histories. Take, simply, the pride of the performer who has reason to be proud. "You may have holes in your shoes," Hines told one of his sidemen, "but don't let the people out front know it. Shine the tops!"

Cowtown Innocence

The Franklin Scare
By Jerome Charyn
Arbor House
324 pp. $8.95

WILLIAM PLUMMER

It is important to catch Charyn's first note. "It was a cowtown compared to London, Paris, or Berlin, a carbuncle south of Baltimore . . . to house a squalid little government that was frightened of its thirteen constituent states. . . . It was a city of mosquitoes, Washington, D.C., with a dampness that bit at you in the winter and made you feverish in the long summer blaze. It couldn't even rule itself. . . . But it was the wartime capital of the world."

About 150 years are telescoped in this portrait of the nation's capital in 1944, but no matter—the compulsions of the climate remain the same in Roosevelt's reign as in Jefferson's. Jerome Charyn is a decidedly *American* novelist. It is important for his art that the American Myth remain intact, that the rude energies of the nation's first days are still electric, that they are generated by the same "cowtown" innocence, that even at so advanced a date as 1944 there are passions and conditions commensurate with the novelist's seriocomic capacity for wonder.

The Franklin Scare spins out from Oliver Beebe, FDR's barber on permanent loan from the navy, a handsome sailor-cipher like Melville's Billy Budd, who appears to the novel's characters to have extraordinary influence over the President by his ubiquity and intimacy—by his drawing the water for FDR's bath. Oliver's sister, Anita, is entangled with two lovers and a Spanish marquis who would use the sailor to get at Allied battle plans, to depose Roosevelt and install Hitler—who, in their millennarian scheme, would make the blacks lie down with the whites in a blissed-out American Utopia.

Everyone wants a piece of Oliver Beebe. A local madam, Edgar Hoover, Joe Stalin, Winnie Churchill, and Ethel Rosenquist, switchboard operator, are all hot after the President's "child." Alas, with FDR's death, which concludes the novel, Oliver loses his cachet. He is reabsorbed by the navy, to inventory peanut brittle in the commissary at Portsmouth, New Hampshire.

At first glance Charyn's 10th novel appears to be, if not *Advise and Consent*, then *Ragtime*—history shot with fiction. Charyn has done his homework; he assuages disbelief with trivia made still tastier by imaginative seasoning. (In actuality, FDR *did* have a "lucky gray fedora." But when running for a fourth time he did not, as Charyn embroiders, have to retrieve the hat from Jack Benny who had outbid Edward G. Robinson for it at a March of Dimes-a-thon in 1941.) Yet the authority in Charyn's voice is more captivating than the authenticity of his facts and derives from the rigor he brings to his materials.

Unlike Doctorow in *Ragtime*, Charyn has no small talk. Every character, every event must be raised to significance through a range of high rhetorical, often psychoanalytic,

WILLIAM PLUMMER is the Book Review Editor of *Quest/77*.

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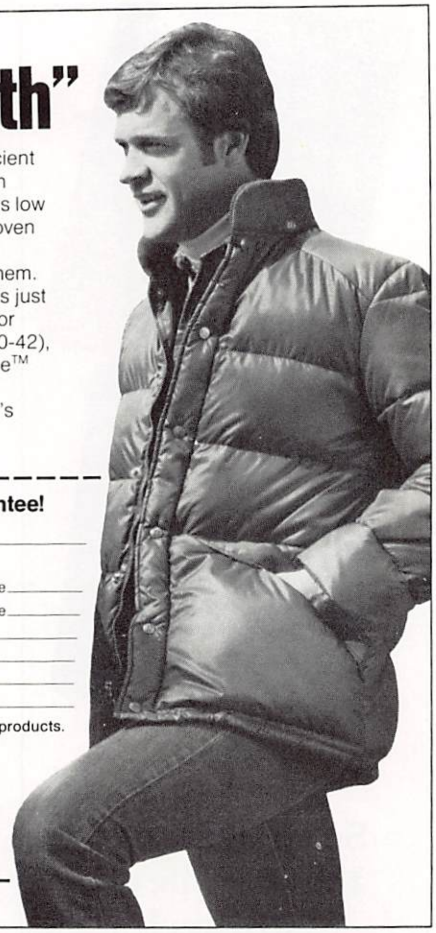

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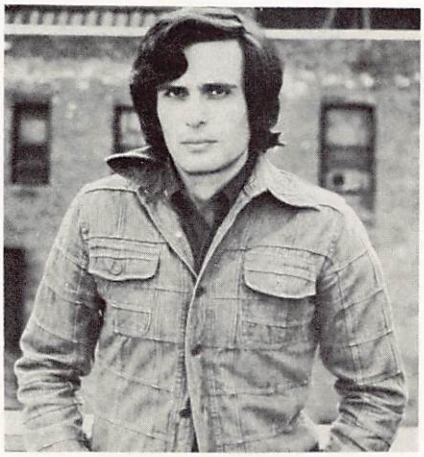


BOB JEWETT

Jerome Charyn

means. It dawns on the reader, for example, that Charyn perceives his characters as a sort of Family of Man, that FDR—given his illness—is an absentee patriarch, that sibling rivalry, the very politics of love, is the order of the day. Thus, Anita's relations with her lovers, as well as with Oliver, take on the quality of incest. The effect is to set each liaison bristling with a comic Oedipal intensity.

And Charyn has, for the most part, the language to bring it off. He might well be musing on his own powers when he says of one character: "His words were like the pincers a grocer used to knock down packages of toilet paper from a high shelf." Charyn's prose is charged by compactly violent verbs—gouge, nibble, bite, scratch. He describes Eleanor Roosevelt's garden as replete with "summer tulips that could sweat in the dark, roses with enough pink in them to kill, irises that could have swallowed a fingernail." This is language with the capacity to maim, but the pincers are delightfully blunted by their comic purpose—and the reader survives *The Franklin Scare* unscathed, his capacity for wonder enhanced.

FILM

Fiction Translated

GERALD JAY GOLDBERG

A great work of fiction is rarely turned into a great film. For every memorable cinematic translation—George Cukor's *David Copperfield*, for example—there are dozens of botched mutants such as Jack Clayton's *The Great Gatsby*, Richard Brooks's *The Brothers Karamazov*, Martin Ritt's *The Sound and the Fury*, and Henry King's *The Sun Also Rises.* Lack of competence, of course, probably explains many of the failures. But perhaps the poor conversion record has something to do with the process of conversion itself.

Forget about the quick-money boys. The conscientious filmmaker wants to do a good job. He is transposing a great novel to the screen, dealing with a cultural treasure. He quite understandably respects his material and wants to do it justice. Difficulties arise when respect turns into reverence, making faithfulness to the original result in a clumsy, unimaginative lockstep.

Two years ago, I threw caution to the winds and accepted an invitation to join a 12-member panel that would help select significant American short stories to be made into films. Learning in Focus, the New York-based organization in charge of the program, was supported in its ambitious plan by grants from the National Endowment for the Humanities, grants that eventually would total more than $2,000,000.

Whereas in the past the novel had had an uneven movie career, I thought the short story might be a stellar performer of the future. After all, Robert Enrico had once taken a story by Ambrose Bierce, *An Occurrence at Owl Creek Bridge*, and turned it into a cinematic gem and a 1963 Oscar award winner. Other filmmakers might do as well.

Under the supervision of Robert Geller, executive producer and president of Learning in Focus, nine of the works selected by the committee became the films that were recently presented on television by the Public Broadcasting Service. The series was entitled *The American Short Story*, and the works included ranged chronologically from the 19th century and Henry James's *The Jolly Corner* to our own times with Flannery O'Connor's *The Displaced Person* and John Updike's *The Music School.* Viewers seemed pleased with what they saw.

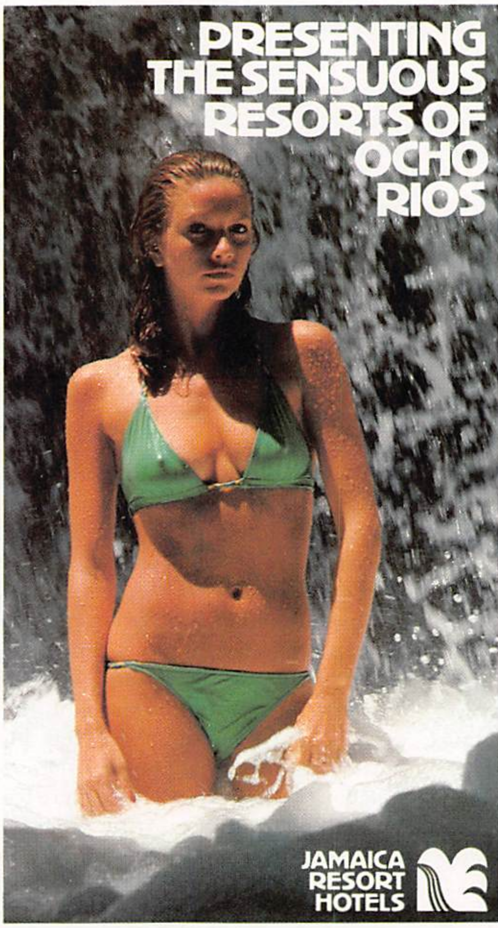
GERALD JAY GOLDBERG is a professor of English at UCLA. His novels are *The National Standard* and *The Lynching of Orin Newfield.*

Critics wrote enthusiastically. Given the series' apparent success, the methods employed in transposing material from one medium to another may prove instructive.

"Fidelity to the authors' intentions," according to the Humanities Endowment, "was a fundamental objective of the project." To achieve this end, directors and writers were assigned to those stories in which they felt a special interest. Although sympathetic to the idea of fidelity to the text, Academy Award-winning Czech filmmaker Jan Kadar and such other talented artists as Glenn Jordan, Joan Micklin Silver, John Korty, and Arthur Barron had no desire to make an exact duplicate of someone else's original, albeit a classic. Nor did they wish their work to be merely a visual illustration of the fiction. "Always," said Kadar, "there is the question of the filmmaker's personal interpretation." Maintaining their imaginative freedom from constraint, these directors, by and large, were able to capture the essence of the stories they were dealing with much more effectively than if they had settled for mechanical line-by-line translations.

They were aided in their efforts by the extent of the artistic control available to them—an amount unusual in the movie industry. The directors of four of the nine films, for example, were also the writers of their own screenplays. As a consequence, the cohesiveness of their personal visions in these short films was considerably strengthened. In fact, the very best work done for *The American Short Story* reflected, in its economy of means, well-integrated concentration.

Take Fitzgerald's wry story *Bernice Bobs Her Hair.* From its opening vignette of a crowded balcony of middle-aged, large-bosomed ladies "with sharp eyes and icy hearts" observing a dance floor stage on which is being played out "the drama of the shifting, semicruel world of adolescence," Fitzgerald tempers his romance with irony. His is a bittersweet tale of 18-year-old Bernice, trapped by her taunting cousin Marjorie and her own bravado into bobbing her long hair, while outside the barbershop window at the Sevier Hotel half a dozen small boys watch in astonishment, their noses flattened against the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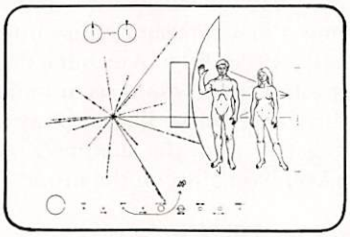

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glass. Fitzgerald's final irony is his description of Bernice, scissors in hand, tiptoeing into the room of her dozing cousin.

Joan Silver's film version of the Fitzgerald story opens in the women's dressing room at the country club. Muted dance music can be heard outside as the attractive Marjorie removes a handkerchief from her purse and, carefully opening it, reveals a red jelly bean. "Marjorie!" squeals her friend Roberta, snatching it up and beginning to apply it to her mouth like a lipstick. "You saved my life." Not found in Fitzgerald, though faithful to the spirit of his work, Silver's initial image is wonderfully compact. By means of the implied attitude toward cosmetics, it at once establishes both historical period and social class. Here, too, there is irony in the clandestine nature of the scene, albeit a somewhat gentler irony than Fitzgerald's. Smug as a peacock, smooth as plastic, Marjorie is disclosed as a young woman who knows all the tricks. Enter cousin Bernice, her summer guest from Eau Claire, who obviously knows none of them. From our very first view of the gawky and socially inept visitor, there seems to be an inevitability in what will follow once Marjorie decides to take her in hand. Bernice must brush her eyebrows every night, master the rite of the red jelly bean, smile with her mouth closed, learn how to look "like a million dollars," dance "like a dream," and chat about the only three topics of conversation that count if a girl wants to be popular: you, me, and us. Our last vision is of the new Bernice on her way home. Hair bobbed, she has been transformed into a "snazzy vampire." As she walks off independently in the middle of the night under the street lamps, her hips swaying with sophistication, she is twirling her cousin's amputated braids. The music by Dick Hyman is brassy, with appropriate ironic overtones, and the dazzling variety of flowers included by Silver in almost every frame of film hints subtly at Fitzgerald's fondness for the rich, the young, the lovely, and the heartbreakingly transient.

Is there a future for the short story on film? Geller says yes, and I tend to agree with him. The National Endowment for the Humanities has awarded $350,000 for preproduction work on a second round of stories. Citing the innovations of cable and syndicated TV and the possibility of a new sophisticated audience with a taste for viewing provocative short films, Geller looks forward to a time when an audience of four or five million will not be looked upon as a commercial disaster.

Paradoxically, the future of such a development may hold dividends as well for the book-publishing industry. Professor Calvin Skaggs, a Geller adviser, noted happily that one day at Andalusia (the Georgia farm owned by the late Flannery O'Connor, where the filming of her *The Displaced Person* took place), he observed something remarkable. While munching their burgers during a lunch break, half a dozen of the crew members were lost in their copies of *The Complete Stories of Flannery O'Connor.* Then, too, there was the letter that came to the offices of Learning in Focus from a six-time loser in a Midwestern jail. After seeing the first few films in the series, he had gone to the prison library to read other stories by the same writers. "It's not easy to explain," he wrote of his experience. "I felt the way I used to when I wired up for a job. I mean it was wonderful. God bless you all!" There may be difficulties in transposing a first-rate short story into an equally successful movie, but it can be done, and there would seem to be an audience. Filmed fiction may not spring you from the slammer, but it can keep you alive on the inside.

FOOD & DRINK

The Royal Bird

GEORGE & JACKIE WARREN

In a supposedly egalitarian society all holidays are equal; that's our nod to the American Dream. The truth is, though, that some holidays draw more water than others, and the best test of a really sacrosanct holiday is whether or not the national bureaucracy has, by now, bumped it over to Monday or Friday to accommodate the public employee.

Measured by this yardstick, the hands-down, no-holds-barred champion holiday in America has to be Thanksgiving; imagine a holiday that still falls on a Thursday every year, rain or shine. In truth, it may be our only really indigenous festival, and its supremacy may well be due to its almost total lack of political or sectarian religious significance. It's the one festival everybody can agree upon.

This said, it's no surprise that the feast we've built around it is as sacrosanct, and as tradition-bound, as the holiday. The golden-brown turkey, carved whole at the table, its dark meat nice and dark, its white meat totally free of that pink tinge turkey meat isn't supposed to have. The stuffing. The drippings for gravy . . .

Well, that's the way it looks, and it looks just fine. It's just that the stuff doesn't *taste* very good, usually.

Let's examine the tradition for a moment. Remember how it worked out last year? The bird was so pretty you almost hated to carve it. In fact, it was downright unpleasant when you did, with every wiseacre at the table poking fun at your technique with the knife, and you couldn't wait to get that part of the ritual over with.

And when you had, how did it taste?

That golden skin, for instance, had the consistency of an old baseball glove, didn't it? And that whiter-than-white breast flesh was as tender as third base, and as juicy as jerky. The stuffing was a mess of upholstery innards, and the "gravy" was a pot of gooey drippings that ran out before it got to your end of the table. Worst of all, everything was dry, dry, dry.

At America's first Thanksgiving feast the big bird shared the honors with other main dishes such as goose, venison, baked oysters. Worst of all, our forebears roasted the turkey on a spit—easily the worst way to cook a light-fleshed animal like a bird. This method leads to the old problem: tasteless inner meat; juicy, but almost inedible, skin.

By Revolutionary days, the chefs *should* have been able to borrow an idea or two from the French; it was, after all, the century of Escoffier and

GEORGE WARREN is the author of 31 books. JACKIE WARREN is a former managing editor of *Art Education.*

Brillat-Savarin. But the master overdoers of the age let us down, preferring to stuff the bird with truffles and cook it the way they cooked a goose (a much different bird). Way, way down the list of available recipes was the one Alexandre Dumas called turkey *des artistes*—a poor folks' dish, the ancestor of our own royal bird.

We ignored his recipe for a while. But simplicity won out in the end, as it usually does. So this year, to get our third century rolling, we decided to try Dumas's approach, using the cheapest, toughest tom we could buy. It is guaranteed to send the pickiest eater back for more; because it is so moist and juicy, you'll never need another recipe.

We have our choice, after all. We can cook for show or we can cook for taste. The old method was for show, and it looked fine—but that was what got us into trouble in the first place. So this time we're going to make ourselves a Thanksgiving turkey that looks downright bad: a bird so unsightly that we're going to have to carve it way out back in the kitchen. Which, in fact, is where the process belongs, as you'll happily agree once you've tried moving out of the line of fire, where you can hack and swear away at the bird to your heart's content. That ugly bird, however, will taste heavenly.

What we're going to do is turn the bird upside down and cook it very slowly at low heat—so low that we'll be flirting with the minimum internal temperature the flesh has to attain if all the bacteria are to be killed. Flirting, mind you, but not falling. We'll slightly underdo the bird, and this time dark and white meat alike are going to have an unfashionable pink tint to them. Never mind fashion: we already know what kind of a recipe that produces. The same with the breast skin: this time it's going to have rack marks—but for a change the breast will be as tender and juicy as the dark meat.

Along the way we're going to have to observe one basic principle: trust the recipe. The bird just isn't going to look done. Don't worry about that: we're doing something new, with new rules. And don't fret if you can't find that half pint of sticky drippings you're used to finding in the pan. It'll

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all have cooked its way down into the breast meat, where it belongs. In its place there'll be a dark gob of something much thicker, much more concentrated. This is Essence of Turkey, and it'll be enough to flavor almost unlimited amounts of rich gravy—but you'll make it the way you make gravy for roast, adding other ingredients to fill it out. And you'll never settle for drippings again. Or dry turkey meat. Or cooking for show at the expense of taste, or blind obedience to a nuts-and-bolts tradition that doesn't work. You'll have a rich new tradition of your own to follow.

Thanksgiving Turkey

Pick out a turkey, 10 pounds or over. Fresh or frozen doesn't matter; buy the cheapest thing you can get, and a tom will work as well as a hen. (It's been years since we paid more than 50¢ a pound for our Thanksgiving turkey.) Defrost if frozen. Remove giblets from body cavities (there are 2, fore and aft) and rinse the bird inside and out, hold up to drain. Boil the giblets in 2 or 3 cups of water for 30 minutes and save stock. Rub butter into the skin if you want it crisp. Stuff neck and body cavities with your stuffing (see below); leave some room, as stuffing will expand. Close off body cavities by sewing shut with needle and thread; an alternate method is to lap the bird's skin over the cavities and fix it in place with skewers or even nails.

Preheat the oven to 275° F. Place the bird, breast down, on a rack in a shallow pan. This is important: you must raise the bird off the bottom of the cooking surface, and the pan must be shallow. A tall-sided roaster will steam the bird, the way the paper-bag and aluminum-foil methods do. This is emphatically not recommended unless you want your turkey meat to come out with the approximate texture of noncrunchy peanut butter.

Roast 22 minutes to each pound of your bird (note: for birds under 10 pounds the absolute minimum is still 220 minutes). You don't need to baste it or, for that matter, even look at it until the time is up.

Then take the bird out. Holding it in a towel, turn it over on a platter convenient for carving. You'll find that the rack has left an imprint on the bird, and that the skin on the breast has not browned. That's the way it's supposed to look. Carve out of sight of your guests, after your usual fashion. The only difference will be that the breast will be much easier to remove in 2 complete pieces. Take them out, letting your knife follow the bone and pulling them loose, and carve them on the diagonal.

Turkey Gravy

This is the simplest method. You'll find a quantity of dark brown goo stuck to the pan, perhaps with some fat if the bird was big and on the fatty side. Skim off fat and reserve. Place the pan, with the brown stuff in it, on low heat; add 1 cup of water and stir until dissolved. Pour off into a container; you'll need it in a minute.

In a separate pan heat either ¼ pound butter or the fat withdrawn from your pan; stir into this an equal amount of flour, making a roux—the basic gravy mixture. Cook this for 1 or 2 minutes, stirring constantly. Add 1 to 2 cups of your liquid giblet broth, and cut up giblets if desired, still stirring constantly until the resultant mixture is fairly thick. Now stir in enough of the dissolved brown goo to give your gravy a rich brown color. Add salt and pepper to taste.

Turkey Stuffing

You'll need 8 dozen chestnuts. Prepare them the night before; they're a real bother to fix under pressure. Cut a cross on the flat side of each; boil them a few at a time; pull off the skin while they're still warm. Chop and mash the nuts until they're in small pieces.

At stuffing-making time, melt 1 tablespoon of butter in your saucepan; add 1 small onion, finely chopped; fry until soft. Add 1 pound of chopped sausage; cook and stir for 5 minutes. Add the chestnuts, and mix well. Season with salt and pepper to taste and ¼ teaspoon of thyme. Mix well; stir in 4 cups of fresh breadcrumbs or packaged seasoned breadcrumbs. Stuff the turkey with this, as above.

TRAVELERS

The Postcard Theory

JOHN KEATS

In these days of chartered jets, packaged tours, and no surprises, it may seem to you that travel in Europe has become a sort of bus trip to a middle-class amusement park where people speak English with a foreign accent. Perhaps this is indeed the case for millions of tourists, but you need not be one of them. Travel in Europe can still be an adventure in strange lands, provided that you have no idea where you will be going or where you will stay; that you have no reservations and no schedule to follow; that you take nothing with you other than your clothes, your money, your passport, an open mind, and a willingness to learn.

My wife and I have been following this excellent advice for many years, beginning with a day on our first trip abroad when we were driving north from Rome on the Via Aurelia and saw, off to the right, a hill town surrounded by a fortified wall. It was getting on toward lunchtime, and we had never before seen a fortified town. We turned off the highway and followed a road through fields of poppies and up the hill and through an arched gate in the ancient wall, and stopped in a sunlit, cobbled piazza. We strolled for more than an hour through stone streets worn by the use of ages; we passed beneath a number of tall, rectangular towers that were apparently medieval and that were still being used as residences: the flags they were flying were the brightly colored laundry of their owners. The view from the massive, crenellated walls was one of steep valleys, olive groves, vineyards, and, miles away to the west, the Tyrrhenian Sea. We wondered where we were. We had not paid attention to the road signs.

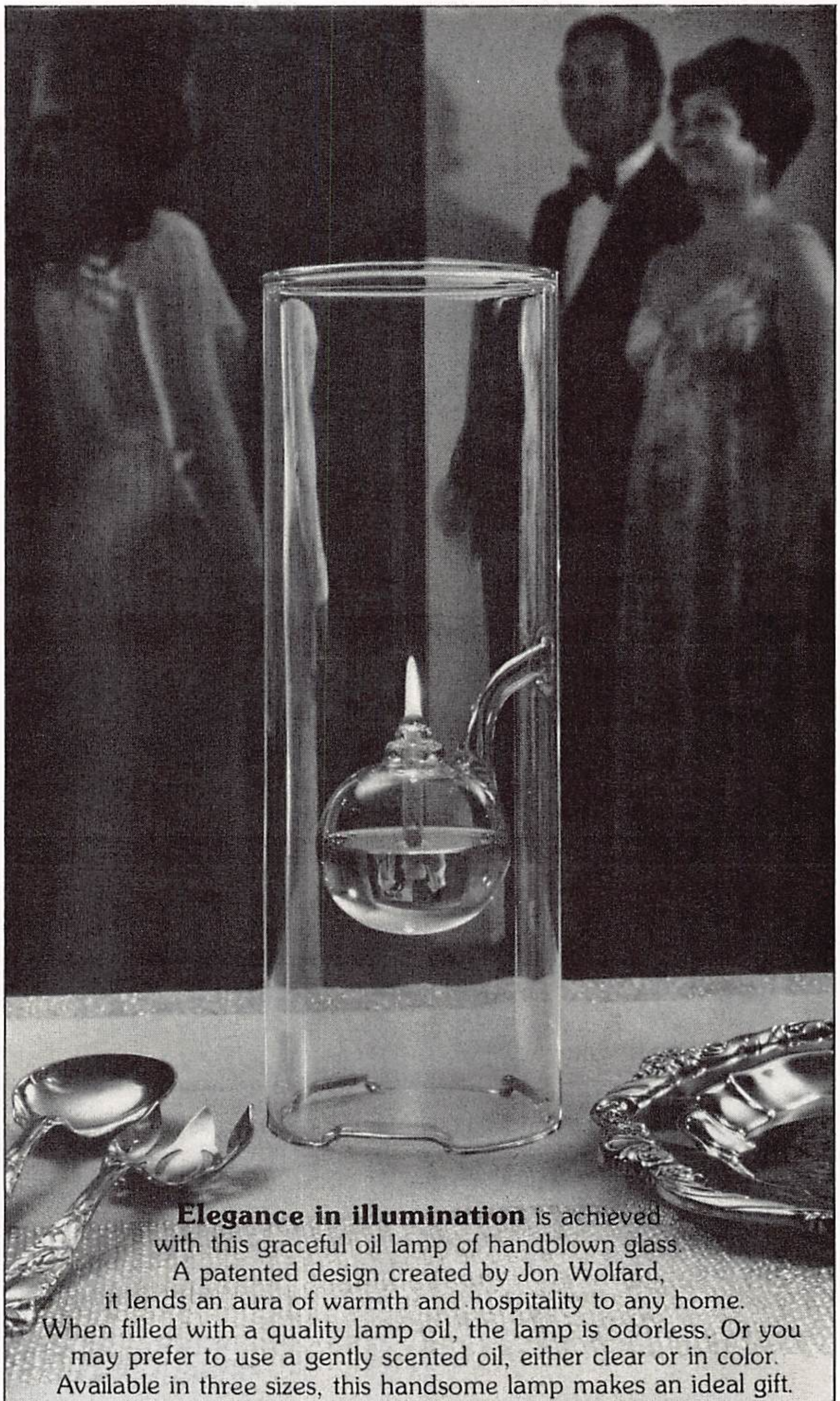
Yet it did not seem important to know, precisely, where we were. What really mattered was sharing

JOHN KEATS's most recent books include *You Might As Well Live* and *What Ever Happened to Mom's Apple Pie.*

winding cobbled lanes with burros that were laden with wicker-covered demijohns of wine. The beaded curtains in the doorways mattered, as did the dank streets so narrow that their wet pavements would see the sun only at high noon. A gust of children eddied before a church, kicking a ball made of old newspapers among their skinny legs. The children mattered, and so did the smells of spilled wine and of garlic cooking in oil. At noon, we returned to the piazza to lunch on wine and tiny sandwiches at the café, and the postcards we bought at a kiosk told us we were in Tarquinia.

A bell rang at once in memory's ear. Members of the Tarquin family had been among the ancient Etruscan kings of Rome. The town's antiquity was now explained: Etruscans had been enjoying the view from this hilltop for several centuries before Christ was born. The medieval walls and towers we looked upon were comparatively modern constructions. One of the postcards told us there were Etruscan tombs nearby. I was very glad we had not known the name of the town before we had wandered through its streets, because we might otherwise have gone straight to the Etruscan museum, and out to the tombs, like any tourist on a bus—and never have seen the living town. On that day was born our Postcard Theory of Travel.

Briefly, the Postcard Theory holds that the less you know in advance, the less you can possibly expect, and if you first explore a place by yourself, the impressions you gather will be your own. I don't mean to imply you should know nothing at all about a place before you visit it. I do think, however, that you will never see Europe if you go traipsing about in Karl Baedeker's footsteps while wearing Temple Fielding's sneakers, with Fodor's and Frommer's guides under one arm and Michelin Red and Michelin Green under the other. Nor should you acquire so much particular information in advance that your arrival in any town gives you a feeling of déjà vu. But clearly, your enjoyment of an Etruscan hill town will be enhanced if you know something about the Etruscans. And if you are going to Chartres, intending to see the remarkable Gothic cathedral, you are



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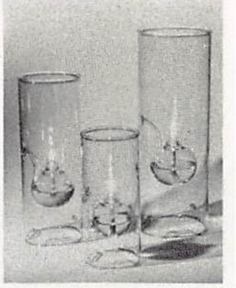

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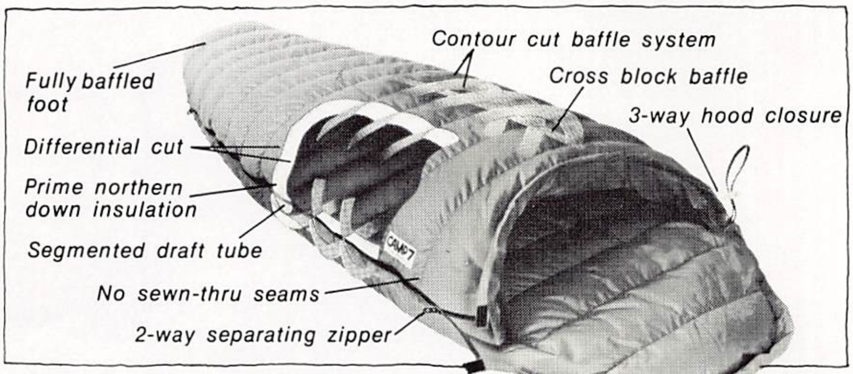

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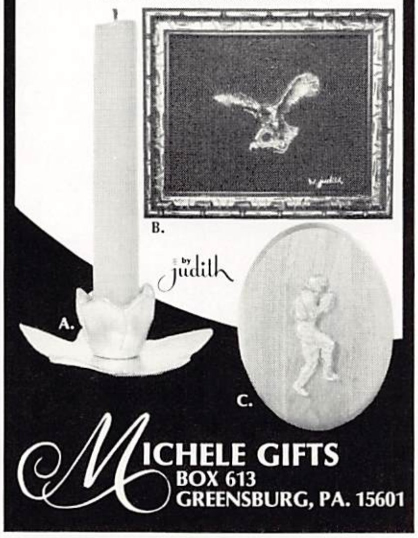

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certainly going to appreciate it all the more if you refresh your historical recollection of the Age of Faith before you go. But do not study the floor plan in advance. You should see the cathedral first for yourself, and alone. The babble of a tour guide can prevent your seeing the cathedral, because if you listen to him, you will see only what he is babbling about. Likewise, if you proceed through the Uffizi with your nose deep in a guidebook or volume of art history, you will never see the paintings.

The Postcard Theory also holds that it does not matter where you go in Europe, because there is so much to see and learn everywhere that you could never come to the end of any region or city in your lifetime—far less in the time you have for travel. Just buy a ticket to anywhere at all, and when you arrive, stop.

Insofar as you have a plan, it should be to arrive in the morning. Check your baggage. Walk around the town in happy ignorance. It is seldom difficult to do this, because virtually all of the wonders of any European city are found within the small circumference of its medieval limits. You may see some totally unexpected jewel embedded in the civic matrix: for example, a Roman or Gothic public building still being used by the no-longer-Roman-or-Gothic public. The important thing is what the existence of that building tells you about the people of the city. People tend to preserve that which they deem valuable, and this, together with what they use and produce, and what they wear, and eat, and how they act, expresses their system of values.

After you have spent the morning allowing the town to speak to you, your choice of a place to eat can best be made by your senses. If it smells good, if you see people going to it, if it gives you a feeling that you would like to eat there, go in. Ask the waiter what is good today. It is our experience that he will give you an honest answer. It is also our experience, particularly in provincial towns and villages, that he may bring you a local specialty whose existence you did not suspect, and whose local name you would not have understood if you are as poor a linguist as I am. I speak as one astonished by a skewer of roasted larks, which were delicious, and by a ragout of wild boar, which would have been much better had the cook taken the pains to remove the hide and bristles. I was also surprised by a wine whose local name was Cuts-your-legs-off.

You will now need lodgings. Ask the waiter at the restaurant, or any three strangers, to suggest a place. My wife and I prefer bed-and-breakfasts, farmhouses that take in guests, pensions, and small hotels, to Hiltons. We do not avoid Hiltons because they are bad, but rather because they are international, and we prefer to live as close as we can to whatever nation we are visiting. We also believe in staying in villages for this same reason. All of the world's great cities are to an extent international, whereas the country towns more exactly express the distinctive character of region and nation. In any case, make your inquiries, inspect the rooms, make your choice, fetch your baggage, move in—and stay there.

We believe that, if you have two weeks to travel, you can learn more about a country by staying in one place than you can learn about it by spending those same two weeks whizzing all around, trying to see all of that nation's advertised glories and spending most of your time en route from one sight to the next.

If you have a place to which you can return at the end of each day, as to your home, you do not feel hurried, and your time expands. You can see the local sights at leisure; you have time to talk with local people and learn what they do and think, and also learn from them things to do and see that are not necessarily mentioned in any guidebooks. You have time to dawdle at a sidewalk café and engage in Europe's favorite sport, which is people-watching. You can explore the surrounding countryside on foot or bicycle, making a picnic of foods you buy en route; you can spend as much time as you wish in a building that captures your imagination. The traveler who follows a predetermined schedule, with all his lodgings and transportation reserved in advance, is pinned like a bug to a wad of paper. Worse, he is apt to have little experience of the people.

In recent years, traveling in the haphazard way I have suggested, we have been fortunate enough to drink bitter ale in a pub with a slaughterhouse worker and tea with a Royal Air Force wing commander; to play King of the Mountain with French children on a sand dune in a forest; to bathe in a hot spring known to Italian peasants but not to the world; to dance with minor Italian nobility and talk with German university students in a beer hall. These, and dozens of experiences with all manner of people, were made possible by our remaining long enough in any one place to strike up acquaintances with the people who lived there. In the process, we have seen many of the famous sights. After all, when you are in Siena, it would be ridiculous not to see the cathedral. To see the cathedral should be one reason for being in Siena in the first place. But it would also be ridiculous to be in Siena and not see the Italians.

Everything depends on the purpose of your trip. If you think it silly to leave home with no idea where you are going or where you will stay or what you will do or see, you have no stomach for adventure, and adventure is what we are talking about.

By my definition, an adventure is an excursion into the unknown, into the province of chance. The reason for engaging upon it is precisely that you do not and cannot know what you will do or what will happen to you. This is half the fun of it. The other half of the fun consists of finding out.

My final advice is that you should take more money than you think you will need, because you will certainly need it. Carry less clothing than you think you will need, because whatever you take will be far too much. Swear a solemn oath to read no American newspapers or newsmagazines while you are abroad, because the idea is not to learn what is going on at home, but to try to find out what is going on where you are. Above all, make no plans. Simply toss a dart at a map of Europe. Where it lands is your destination. What? You have never heard of the place? Wonderful! Find out a little something about it. Now, if you will simply get up and go without looking back and without looking ahead, the next few weeks of your life will be whatever you are able to make of them.

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1 tsp. crushed oregano, 2 cups dry bread crumbs

Cook wild rice, dissolving bouillon cubes in the water. Cut bacon slices into 1 inch pieces and fry with the butter, onions and mushrooms until bacon is crisp, onions tender and mushrooms until lightly browned. Add this mixture to cooked rice, stirring in bay leaves, oregano, celery, and bread crumbs. Salt and pepper to taste. Makes enough stuffing for a 10-14 lb. turkey.

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New Patents

EDWIN SCHLOSSBERG

Cell Control

An unusual and exciting patent has been granted to Dr. Clarence D. Cone Jr., chief of the Cell and Molecular Biology Laboratory at the Veterans Administration Hospital Center in Hampton, Virginia. The patent (No. 4,018,649) is the first ever issued on a generalized process to control cell division.

By monitoring the electric potential in the membranes of animal cells, Dr. Cone found that ionic shifts normally accompany cell reproduction. Electric potential is derived from a cell's electric charge, which is created by the amount of sodium or potassium present in the cell membrane. Cells with high sodium levels reproduce. Cells with high potassium levels do not. By learning to control these chemical shifts, it may become possible to control cell reproduction.

Although research is still in the laboratory stage, Cone's discovery may have wide-ranging medical implications. Cone's lab teams are currently working in two areas of possible application: cancer remission and neuron generation.

In cancerous cells, it appears that the membrane, acted on by any of a number of influences, has lost its ability to pump out sodium; thus it has lost its ability to control reproduction. Restoring normal ionic balance to the cells by adding potassium has stopped cancerous growth in tests using embryonic cells in culture. Further research will apply the process to adult cells in culture and finally to animal tumors. Scientists at the VA Hospital Center will also examine human tumor cells that have been frozen to immobilize their ionic content to see if a formula can be developed to encompass the treatment of different types of human tumors.

Controlling cell division implies the ability to generate cell reproduction in those cells that do not normally reproduce. Cone's theory

EDWIN SCHLOSSBERG is a Contributing Editor of *Quest/77*.

suggests that neurons, the basic tissue of the brain and nervous system, do not reproduce because they maintain negative (potassium) potential. Tests using neurons from chick spines have shown that it is possible to cause cell division in neurons by shifting this potential. The ability to reproduce neurons would revolutionize medical treatment of damage to the central nervous system (paralysis, for example) and would conceivably permit regulation of the aging process, of which the natural death of normally irreplaceable neurons is a part.

Locating People in Distress

The modern spirit of adventure, however admirable, is leading more and more people into emergency situations, ranging from air crashes to mountaineering accidents. Speedy assistance is often the key to saving their lives. But what if the victims are lost or unable to signal their plight?

The solution may be a search-and-rescue system (Patent No. 4,019,179) designed by W. E. Sivertson of NASA's Langley Research Center. Its main component would be a radar transceiver placed in earth orbit. Potential victims would be equipped with passive radar reflectors, easily carried in pockets or backpacks. In emergencies, people in distress would simply inflate the reflectors and arrange them in predetermined message patterns that explained their situation. The orbiting transceiver would transmit their location and message to the nearest rescue center. The system has been tested successfully using radar in aircraft flying at 12,500 feet. Sivertson has applied to the Space Shuttle Program for permission to conduct similar experiments using the shuttle as a transceiver site.

Hepatitis A Culture

A patent (No. 4,029,764) has been awarded to three scientists from Merck Inc. Laboratories that may lead to the eventual discovery of a vaccine for infectious hepatitis (hepatitis A). Drs. Maurice Hilleman, Philip Provost, and Oswald L. Ittensohn have discovered what Hilleman calls a "diagnostic tool" that will enable hepatitis A viruses to be grown in laboratory culture for the first time. Their method will be useful in further research on the particular properties of the viruses and both surface and nuclear-core antigens, substances that cause the formation of antibodies. This is the initial step in the preparation of viral vaccines.

There are two types of viral hepatitis: infectious (Type A) and serum (Type B). Hepatitis A is mostly food- and water-borne and is as highly contagious as the polio virus. A person who contracts infectious hepatitis becomes immune to its recurrence but is still susceptible to serum hepatitis. Hepatitis B is not contagious and is transmitted through direct introduction to the vascular system, a hazard of blood transfusions, improperly sterilized needles, or open wounds that have been exposed to the serum virus.

The two diseases are similar, the infectious one usually taking the milder form. Symptoms include weakness, loss of appetite, fever, pain, and jaundice. Hepatitis can occur at any age, but has a higher incidence in children and the elderly.

Researchers at the Hepatitis Activity Surveillance Center in Phoenix, Arizona report a slight decrease in the incidence of Type A hepatitis, with 32,901 cases reported in 1976-77, while Type B has shown a slight increase—14,682 cases. In addition, 8,362 unspecified cases were reported in 1976-77. Due to laxity in the reporting of diagnosed hepatitis, the center estimates that these figures may represent only 10 percent to 20 percent of the actual number of cases of hepatitis that occurred in the U.S. last year.

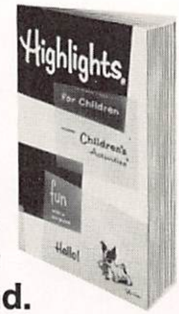
Expeditions

SUSAN HASSLER

The Animal in Art

The World Wildlife Fund, an international organization dedicated to protecting endangered species and wilderness areas, is sponsoring a series of unusual exhibits to dramatize mankind's ageless interdependence with other animal species. Called "The Animal in Art," it is the brainchild of former *Look* editor Fleur

SUSAN HASSLER is on the staff of *Quest/77.*



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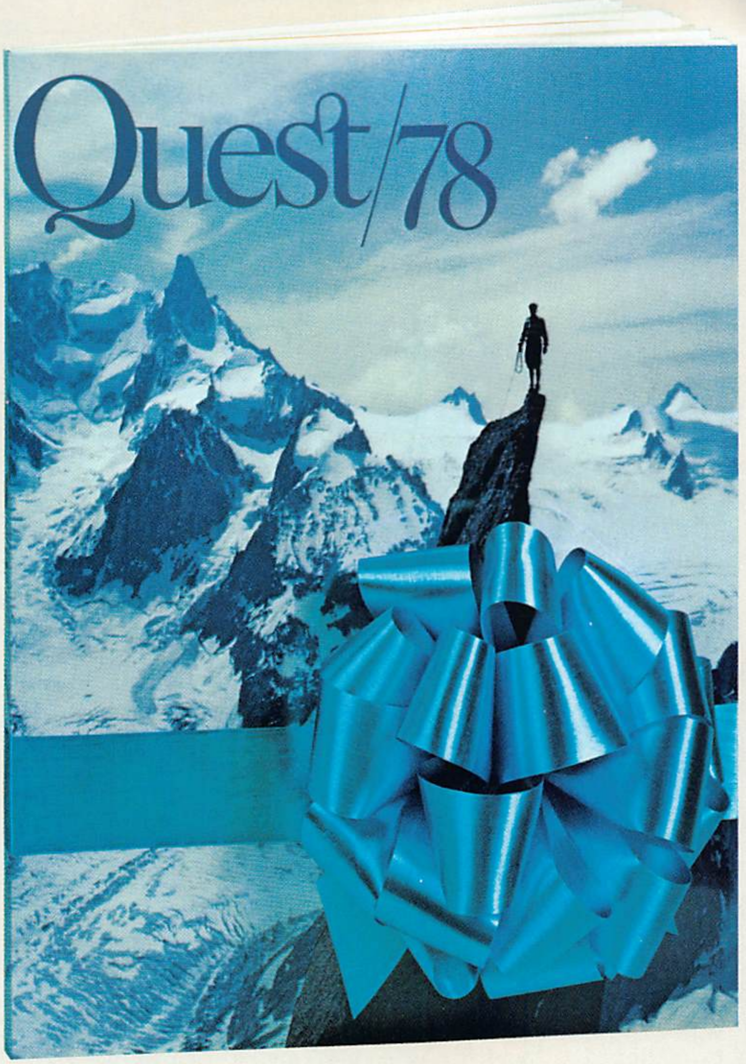

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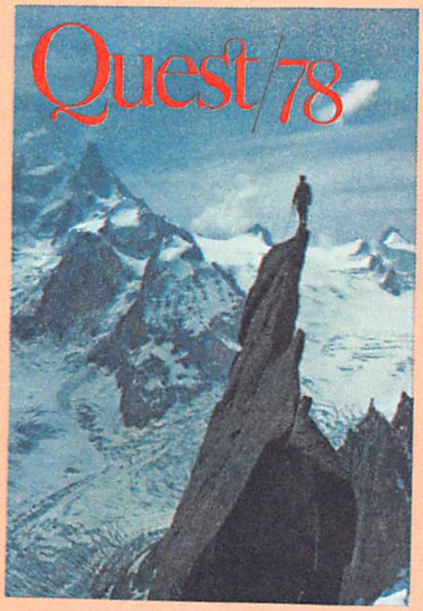

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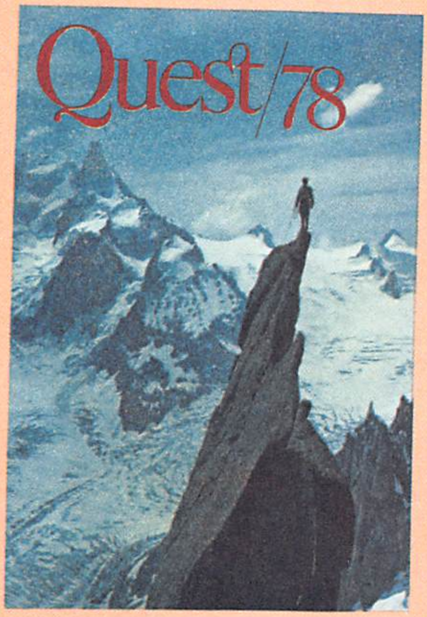

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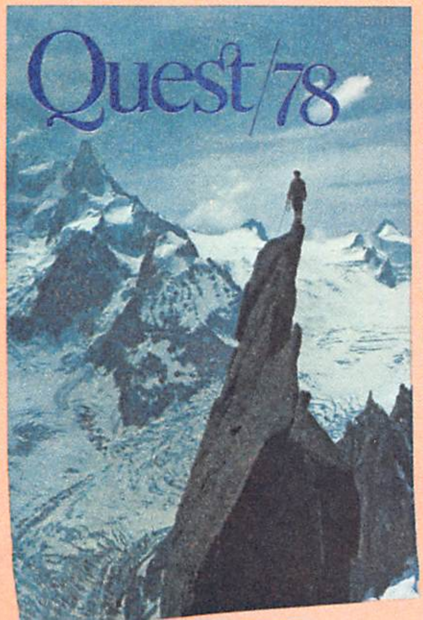

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The Gift of Excellence

Cowles, an international trustee of the fund. She began organizing the series in 1976, and to date museums in 11 countries, including Denmark, India, South Africa, Spain, Turkey, Great Britain, New Zealand, and the Soviet Union, are slated to mount shows around this theme.

U.S. exhibits will be at the Natural History Museum of Los Angeles County (Nov. 16-Feb. 19), the Smithsonian Institution in Washington, D.C. (Nov. 17-Jan. 15), and in a number of the libraries and museums of Yale University (Jan. 20-March 20). In addition to conventional media, the Los Angeles show will include animal depictions in ethnic art, book illustrations, and cartoons borrowed from Disney Studios.

The Smithsonian show features 50 19th- and 20th-century paintings together with examples of 19th-century sculpture, which will be displayed in the sculpture garden of the Hirshhorn Museum. Many of these pieces have never been seen publicly. Moreover, for the first time in its history a Smithsonian exhibit will include the work of a staff member—Kjell Sandved, an animal behavioralist and nature photographer. Of Sandved's wildlife films and photographs Isaac Asimov has said: "I had expected something unusual, but I must admit that in my wildest dreams I had not counted on anything so entirely fascinating and absorbing as that which you have produced."

One of several British exhibits will be hung in the Royal College of Art in October. Simultaneously, William Morrow & Co. will publish a book entitled *Animals and Men* which Miss Cowles persuaded Lord Kenneth Clark to write. A portion of the book's sales will be contributed to current World Wildlife Fund projects, among them a $10 million campaign to protect ocean resources threatened by pollution and mismanagement.

Polymode Project

We know little about the oceans that cover 70 percent of the earth's surface. Nine out of 10 midocean areas are virtually unexplored. Now technologies developed over the last 10 years are making it possible to map and inventory these most precious resources.

One series of midocean experiments, begun last June and continuing through 1979, is the result of a bilateral agreement between the United States and the Soviet Union. Called Polymode, the joint effort is aimed at studying mesoscale eddies—large slow patterns of oceanic rotation. In recent years these phenomena have been identified as the chief mechanisms for the storage and transport of midocean energy. The eddies vary in scale and force, but they tend to be a hundred to several hundred miles in breadth and to move at only a fraction of a mile per hour. (A sharp exception to this general characterization is the eddies spawned by the Gulf Stream, some of which approach its swift velocity.)

Polymode has two major goals. It seeks to gather quantitative data about selected eddies, and to develop a more generalized picture of eddying patterns in the North Atlantic, which scientists call an "eddy zoo."

Polymode is being coordinated with other projects conducted by Canadian, French, British, and West German oceanographers, and three major sites in the North Atlantic have been selected. When a Tass news release announced that the U.S.-U.S.S.R. work would be focused in the waters southwest of Bermuda, there was a flurry of speculation as to whether the two superpowers were joining forces to solve the provocative mysteries of the "Bermuda Triangle," scene of many ship and plane losses. In fact, Polymode planners chose the area in order to build on the considerable research already under way there. Moreover, it is convenient to the major concentration of oceanographic laboratories on the U.S. East Coast.

During the course of the field program, various cruises will involve nine Soviet and five U.S. research vessels. Eighteen American institutions and four Soviet academies will be represented.

Major readings from the project will not be available until 1979, but the data gathered are expected to benefit diverse disciplines ranging from climatology to fish farming and marine ecology. U.S. participation is funded by the National Science Foundation and the Office of Naval Research.

Paramahansa Yogananda

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CIA Exposé. Former CIA operational agent, now in prison, needs financial, moral, and legal support to prepare, type, and publish exposé manuscript. To acknowledge our mistakes is the first step in building a better nation and world. First, due to regulations, write only: Frank Casuso, 31884138, Box 1000, Leavenworth, KS 66048

Save the Last Dance. Traditional folk dances in Michigan were common before the advent of mass media. In two color documentary films this music will be preserved forever; 60% of total budget is in hand, but a $10,000 grant already procured will be lost unless an additional $5,000 can be found. Donations tax-deductible. Contact: Robert M. Fleck, Project Director, *Save the Last Dance*, Box 67, Williamston, MI 48895

Pacifist's Biography. Ammon Hennacy, self-described "Catholic anarchist," is the subject of a biography I'm about to embark upon. A pacifist who was incarcerated during both world wars, Hennacy died in 1970 while picketing the Utah State Capitol in protest against capital punishment. He wrote much about his own life, but I am interested in personal accounts of his early years, his relations with the IWW, Dorothy Day, and the *Catholic Worker.* William Marling, English Department, University of California, Santa Barbara, CA 93017

University of the Wilderness conducts wilderness field trips, Florida to Montana workshops; accredited courses. It needs administrator; Wyoming ranch environmental education program developer; fund raiser; ski tour leaders; funds. University of the Wilderness, 29952 Dorothy, Evergreen, CO 80439

Afghan-Islamic Research. I am a student of Afghan-Islamic culture; I wish to return to Afghanistan to continue my studies. As industrialization is fast encroaching upon tradition, it is urgent that I go as soon as possible. Funds or matching grants are needed for travel expenses. Karl F. Wolfgang, Box 1041, Wewoka, OK 74884

Children & TV. We've begun a campaign concerning children and television. As part of this effort we'd like to print a publication that would help parents regulate their children's television viewing, making it a constructive experience. Larry D. Johnson, Children's Health Center, Inc., 2525 Chicago Ave., Minneapolis, MN 55404

Rafting. Wanted: sponsors and crew for log raft trip from Louisville to New Orleans, May-July 1978. Reconstructing 19th-century river style: no motors, propelled by river current and steered by rudder sweeps. Crew of 4 to 6 men and women. Estimated expenses $3,500. Contact Philip Babiak, 3416 Deibel Way, Louisville, KY 40220

Youngest Hiker. In 1979 I am going to hike the length of the Continental Divide Trail, and I need sponsors to help support me in this venture with money, equipment, etc. At 16, I will become the youngest person ever to have walked the entire 3,100 miles. In return for support I will write articles about my journey, as well as photograph it in great detail. Russell W. Bennett, 5 H St., SE, Auburn, WA 98002

Healing Center. I would like to start a health resort, research center, and organic gardening community to make available to the public many of the forms of natural healing and therapies described in the Potentials section on *Healing* in the May/June issue of *Quest/77.* Mrs. Jamie E. Mumford, 304 East 3rd Ave., Havana, FL 32333

Stable Economy. My desire is to complete the presentation of a new theory establishing the just basis for a stable economy, an end to boom or bust. Social theorists stress the necessity of such reform, but lack a model. Help me in my research, and we can give them one. Mrs. Julia Corona Stewart, Haverford Gables, Apt. B-1, Haverford, PA 19041

Lighthouse Photography. My Everest is to provide a permanent photographic record of the lighthouses of North America from Nova Scotia southward around the continent, then north to the Aleutian Islands. Many of these historic symbols of hope are being abandoned to nature or land speculators. Financial help needed. Dave Majure, 6600 West 95th St., Shawnee Mission, KS 66212

Barter. In this era of inflation and burdensome taxation, barter—the voluntary exchange of goods and services—is a growing phenomenon. A new barter group in Los Angeles is accepting requests for exchange of skills and services in southern California. Entry in our files is free. Minimal service charge per referral. Barter Referral Service, 1251 No. Chester Ave., Pasadena, CA 91104

Appalachian Attempt. My quest: to backpack entire Appalachian Trail alone, a woman. Need practical advice tailored to suit a woman's need concerning emotional preparation, quantity and quality of equipment, etc. Is there a woman who can give such advice? Martha B. Joyce, 529 Rockford St., Mt. Airy, NC 27030

Sensory Deprivation. I want to experience sensory deprivation for an extended period of time. I would like information on how to build and stock an isolation chamber in which sight and sound would be nonexistent. Wily Elder, Box 012951, Miami, FL 33101

Presidential Candidate. I want to be the first independent President of the United States. I need a Vice-President; I would also like to assemble my Cabinet members now so that the public will know who they are and what they stand for. If you are interested in my campaign, please contact me. James R. Montgomery, Rt. 1; Box 5, Oronogo, MO 64855

Energy-Efficient House. I am a high school student. My goal is to design, build, and reside in an energy-efficient house run on solar and wind power. I would like to prove that a high standard of living can be maintained without using precious fossil fuels or dangerous nuclear energy. Scott Lawton, Rt. 8, Box 415-36, Houston, TX 77084

Peace Corps Community. We want to build a community for energetic returned Peace Corps volunteers in which we can pursue meaningful work for Third World countries by researching and publishing information regarding problems in agricultural development, nutrition, education, energy, etc., for PCVs currently in the field. John and Kathleen Diehl, Box 4202, University Park, Las Cruces, NM 88003

Yellow Book. Before age 73, I must complete *The Yellow Book*, a compilation of humorous notes and memoirs hoarded in a yellow notebook. Our six children and 22 grandchildren enjoyed my short composition presented to them on our golden wedding anniversary. How do I begin? Margaret Winters Baatz, 381 Stambaugh Ave., Sharon, PA 16146

Dream Research. I have been recording my dreams for four years and have noticed many instances of metaphoric transformation, such as that of animals into people. Please send examples of similar experiences for publication in a master's thesis. J. Manis, 6806 Bonnie Ridge Drive, Apt. 202, Baltimore, MD 21209

Self-Actualization. I have developed a system that encourages individual self-actualization, while optimizing the performance and profits of an organization. The system has been endorsed by some of the world's top thinkers. I need an innovative senior executive to implement and test this system, or funding to publish it. Harold R. McAlindon, 6331 Wildwood Valley Drive, Nashville, TN 37207

Creativity Workshop. We are trying to define the ingredients of environments that enhance creativity, especially among the gifted. Middle school students, parents, and artists will seek to share in the discovery of each individual's creative vision and needs in a residential workshop, to take place in Maine in June 1978. Help in funding needed. Laurence Becker, Bucks Harbor, ME 04618

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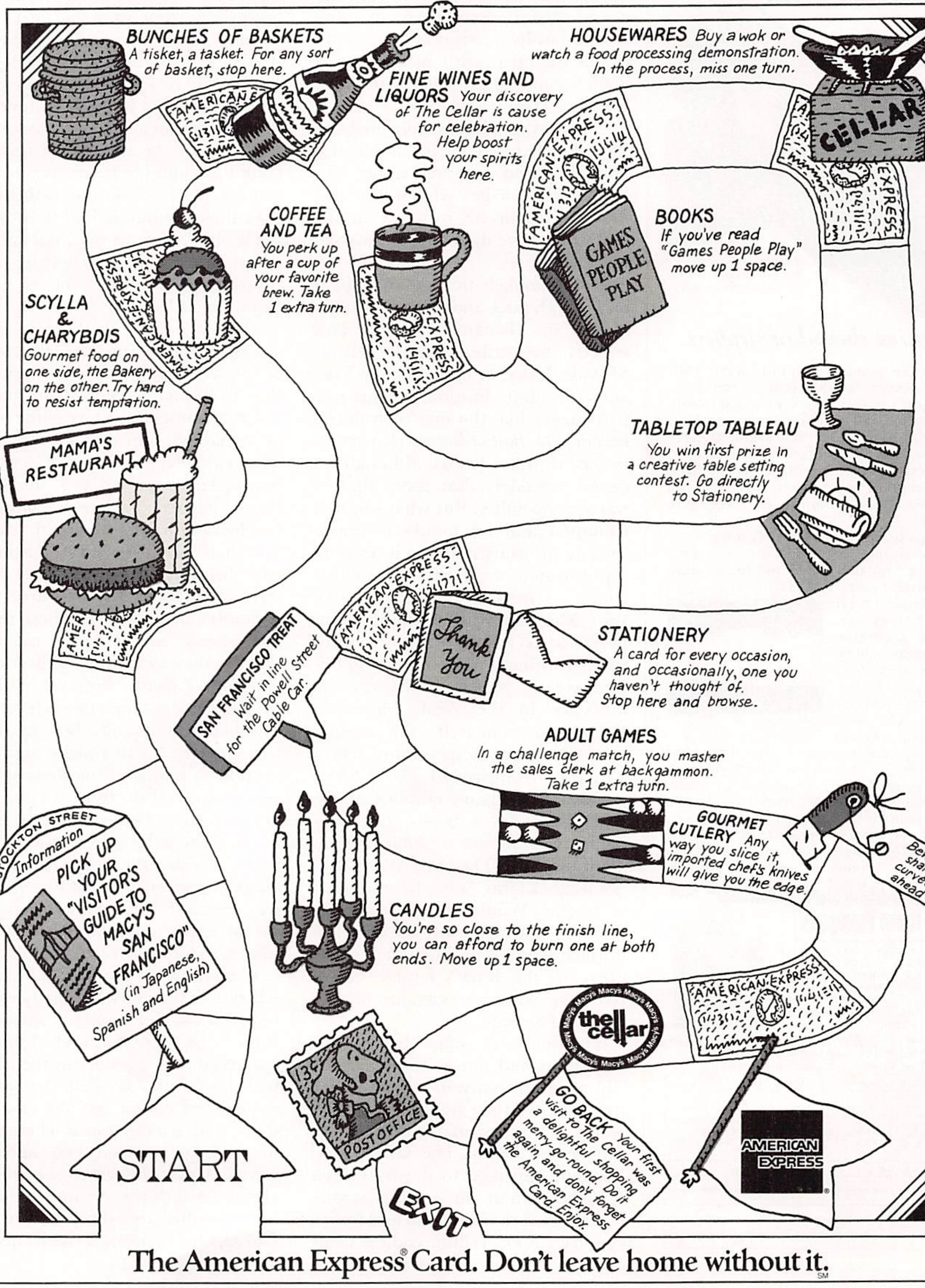

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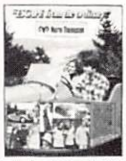

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SAINT COLUMBA'S LEGACY

Continued from page 24

did illuminate two other manuscripts which will be on show in America: the *Book of Kells* and the *Book of Durrow*. Scholars discount the first of these as being in a later style than his. About the *Book of Durrow* they are not so sure. It does appear to come from Iona. Its inscription hauntingly recalls the great crisis in Columba's life, his copyright quarrel with Saint Finnian. Here it is in full:

"I ask thy blessedness, holy presbyter Patrick, that whosoever holds this book in hand may remember Columba the scribe, who wrote this manuscript for his own use in the space of twelve days by the grace of our Lord."

It's not unlikely that Columba held on through thick and thin to the copy of the New Testament that he had secretly transcribed in his cell at Moville. Later, at Iona, he may have adorned that historic manuscript with pages like the one reproduced herein. The *Book of Durrow* may really be his, in other words, although no expert considers that more than a remote possibility. But what inspired Columba and his monks to create such an instantly rich and supremely sophisticated art form? The tribes closest to Ireland knew nothing of this. Manuscript illumination was practiced in Constantinople, true, but the Byzantine civilization was so distant as to possess practically no influence in the West. Moreover, Saint Jerome himself—the original translator of the Gospels into Latin—actively disapproved of *"Litterae unciales,"* the luxury editions of the Byzantines. "Not books, but burdens," was Jerome's pungent comment on these. The Holy Word, and not its packaging, was what mattered to Jerome. Would one draw decorations or illustrations into the body of a musical score? No? Then why try to dress up the Bible? Jerome had a point, but history was against him, to our good fortune.

Thousands of years before, the Egyptians had interred marvelously illuminated papyrus scrolls with mummies of their noble dead. Such works were intended as guidebooks to the nether realm. The Greeks and Romans also used to illustrate their favorite authors on papyrus scrolls. Then, between the second and fourth centuries A.D., vellum codices came into fashion. These were leaved volumes like our own. They proved a boon to illustrators, who could now approximate wall-painting effects in miniature from page to page. No early examples of this new art survive, however, except in single leaf-fragments. There is nothing to foreshadow or explain the thousand-year outpouring of European illuminated manuscripts that began in Columba's time. This became the quintessential small art of the medieval Christian church, as unique in its way as the stained glass of Gothic cathedrals. Like them, it mainly had to do with the Bible. And if any one man may be given credit for originating and propagating the flow, he is Saint Columba of Ireland.

They that seek the Lord shall not want for any good thing. So runs the tenth verse of the 24th Psalm. It is the last line that Columba copied out in manuscript. "Baithene must write the rest," he remarked, and died on the spot. The year, 597, was the same in which Saint Augustine arrived in Kent. Pope Gregory the Great ("Gregory Goldenmouth," as the Irish called him) had commissioned Augustine to win Britain to Christ. The Pope seemed practically unaware that Columba, behind the northern mists, had already accomplished much of that mission. Within two centuries of Columba's death, however, Viking raiders rendered Iona desolate. Other conquerors followed, but most of them revered the tiny island as sacred ground. A tourist of the Renaissance period counted the tombs of 48 Scots kings on Iona. Duncan and his murderer, Macbeth, were both buried there. Besides the Scots, four Irish kings and seven kings of far-off Norway rested in Iona's rare, hospitable bit of earth. And all because Columba's story sanctified the place.

It remains holy ground. "That man is little to be envied whose piety would not grow warmer amongst the ruins of Iona." So Dr. Samuel Johnson remarked after pacing out the island with his faithful Boswell. An anonymous Scots crofter put the case like this: "Iona is a thin place. There's not much here between you and the Lord." Upon this green sea-cradled earth, beneath the streaming clouds, one breathes the sharp air of the Cross. One converses with history

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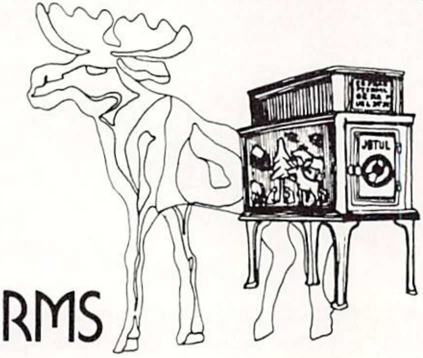

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among these stones, sensing the presence of Saint Columba's own dust somewhere under the moss, and his benediction.

The Irish genius has not changed essentially, I maintain, from Saint Columba's time to the present day. Rainbow-hued texts fountained anew from Ireland in comparatively modern years: a literary Renaissance of amazing brilliance and force. Tight, bright, and not unwounding wit distinguishes Irish letters, and always has.

Besides translating the Bible, the indefatigable Saint Jerome translated and updated the would-be world history composed by Eusebius and called *The Chronicle.* Eusebius taught that four great kingdoms—Assyria, Egypt, Palestine, Greece—had culminated in the Peace of Rome, which Divine Providence merged into the Empire of Christ centered upon Constantinople. Eusebius's text employed parallel columns, one per kingdom, so that the whole story could be pursued simultaneously through each of them. So-called "synchronizers" (the Gaelic word is *fer comgne*) undertook to copy out Jerome's translation of this work in Irish monasteries, meanwhile adding another column for Ireland herself. To dignify the process, it was presumed that the old heroic tales had been transmitted to Saint Patrick by the ghosts of pagan participants.

Now for a 1,300-year leap. James Joyce, with his rigorous Irish Jesuit education, knew all about Eusebius, Jerome, Patrick, and the sanctification of pagan Irish tradition. I suggest that he wrote his last and greatest works deliberately in the spirit of the *fer comgne.* Joyce's *Ulysses* synchronizes Homeric legend with a day in Dublin, as if redacting adjacent columns of history into a single story. His *Finnegans Wake,* for all its involuted language, speaks as from the sepulchre in the distant voices of multitudinous Irish dead. Although his literary means were self-conscious in the extreme, and sometimes appear as secretive as Longarad Whitefoot's, James Joyce's ends were epic and traditional.

"Pleasant is the glint of the sun today upon these margins, because it flickers so." A nameless Irish monk of the eighth century, hunched in the chill of a scriptorium with a quill in his fist, penned in that observation at the top of a page from *Cassidorus on the*

Psalms. He had been copying out the same text all winter, often by candlelight. Now the spring sun shone in, and he felt moved to celebrate the fact with a brief note. Only Irish copyists made a habit of embellishing their texts with such random remarks. Their comments tended to be concrete, spontaneous, and personal.

This particular note has made me think again about Saint Patrick's rescue from Satan in the glint of the sun, and also about that rock crystal glinting from the hollow base of the *Ardagh Chalice.* Sunlight bathes Ireland in a peculiarly intimate glow, as any native or traveler there will tell you. Silver-bellied clouds sail in over the brilliant green of the treetops to drench the grass with mild showers almost daily; then the sun comes back again, attended by rainbows—in minutes, not hours.

Tramping the west of Ireland in particular, as I have done, a person soon becomes accustomed to alternations of wet and dry. I remember descending Ben Bulben through a thundershower to find Drumcliffe graveyard at the mountain's foot, flooded in sunshine. The tombstone of William Butler Yeats is there. By the poet's order it bears this epitaph:

> *Cast a cold eye*
> *On life, on death;*
> *Horseman, pass by.*

The inscription has returned to my thoughts again and again. With those lines and at least a thousand more which are equally musical, if not quite so haunting, Yeats proved himself to be Columba's worthy heir.

A hermit named Mochua once sent a letter to Columba that concerned a cock, a mouse, and a fly. These three were Mochua's companions in the wilderness. The cock crowed him awake at dawn, the mouse licked his ear to keep him alert when he read, and the fly ambled along the notes of a psalter to mark Mochua's place whenever the hermit sang. Now, however, his little parish was no more; all three creatures had suffered death. Such was the burden of the letter. Columba replied: "My brother, do not be surprised that your flock perished. Misfortune always waits upon wealth." Yes, and isn't this all Ireland's case? A divided, battered, bloodied place is Ireland now, and a sad one, although her spiritual inheritance is long and very rich indeed. ●

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WEALTH ADDICTION Continued from page 56

cultural distemper and those who are in the grip of a degenerative and virulent illness. This we can do by looking at the relation between possession and use. The less used one's possessions, the more violent and uncontrollable the addiction.

Possessions have to be cared for and maintained. A man who owns things is simply a servant with as many masters as he has possessions. Ask yourself how you spend your time—how much in enjoyment and how much in protecting or searching out potential *sources* of enjoyment. When we're in the latter condition, we're simply janitors to our own desires. Furthermore, these janitorial services are often provided for pleasure sources that are rarely or never used.

From a strictly rational viewpoint, owning is an extremely inefficient way to maximize pleasure. Unless there is an extraordinary difference in cost or quality, or almost constant use, it makes much more sense to rent just about anything you need—leaving it up to the owner to provide the janitorial services.

One way of looking at money is that at the poverty level money tends to *increase* the options available to us (both for pleasure and for relief from pain), while at the level of affluence money tends to *decrease* the options available to us. This is because of the continued janitorial service that one must provide either for one's money or for the things one purchases with it. And unfortunately, the possession of money also tends to distract us from the innumerable options that don't involve money at all. As we obtain more money, we begin to think increasingly of those pleasures money can buy and decreasingly of all others.

The cure for wealth addiction, then, is the equalization of wealth and the separation of subsistence from the money economy. Equality is a public health measure: by placing lower and upper limits on wealth, through a truly progressive tax system and the elimination of inheritance, we remove the addiction hazard from the healthier segments of the population. Money can then become the plaything of addicts (within limits), leaving normal people to enjoy more interesting and rewarding pursuits. If, for example, the necessities of life—food, shelter, medical care, education, and a pleasant, nontoxic environment—were defined as something to be created *by* all the people and *for* all the people, not something to be bought by those who can afford it, then most of the poor would be safe from addiction. Everyone would work without pay to provide for everyone what no one should have to pay for. All this may seem utopian, but our society is already moving in this direction.

There will always be differences in wealth, since some people are greedier than others and some people are self-sacrificing. There will always be wealth addicts and power addicts. But at the moment our society is structured in such a way as to give exaggerated attention and importance to these more infantile members of the population. All suffer for the benefit of a few addicts.

We also live in a time of chronic inflation. We no longer even talk about getting rid of it, only about slowing it down. The federal government expresses pleasure when the *rate* of inflation is lower than usual, which is a bit like saying, "The weather's

On the Elevator Going Down

A Caucasian gets on at
the 17th floor.
He is old, fat and expensively
dressed.

I say hello/ I'm friendly.
He says, "Hi."

Then he looks very carefully at
my clothes.

I'm not expensively dressed.
I think his left shoe cost more
than everything I am wearing.

He doesn't want to talk to me
any more.

I think that he is not totally aware
that we are really going down
and there are no clothes after you have
been dead for a few thousand years.

He thinks as we silently travel
down and get off at the bottom
floor
that we are going separate
ways.

Tokyo
June 4, 1976

Richard Brautigan

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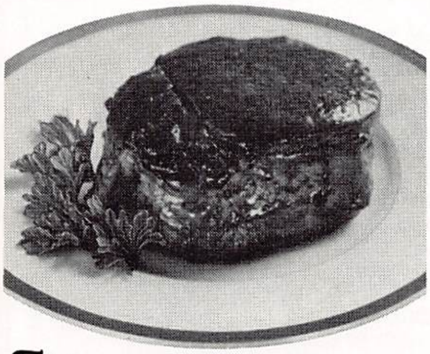

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getting better; it's raining a *little* less than it was yesterday." Perhaps inflation should be defined as the result of an unconscious collusion among addicts to deny the existence of their addiction. Just as heroin and other "hard" drugs tend to become progressively more adulterated over time, so does money—the greatest drug of all. The same amount of money gets the plutomaniac less and less high.

Like drugs, which have useful functions, money is not evil in and of itself. Money is a way of making barter more efficient, and as such it will always have a certain utility. When used properly, money comes in at the end of a train of thought: we think of what we want to do, *then* we think whether any goods or services must be purchased in order to do it. The wealth addict thinks about the money first: what he wants to buy, how to use the money he has, or how to get more. What he wants to do is determined by the money itself or the lack of it. A normal person may want to earn money to buy a house. The addict buys a house to make money.

People who try to control reality to conform to their fantasies and preconceptions usually find that it's not very enjoyable. People who approach life as a stream of events that need not be manipulated but only confronted tend to have a rich, exciting, and joyous time of it: everything that comes their way is a possible pathway to be explored—some pleasant, some unpleasant, some safe, some dangerous, but all interesting. The wealth addict, on the other hand, rejects what is offered by life in favor of the image he has in his head of the reality he wants to bring about. He is like a man who can't enjoy a sunset fully because he didn't bring a camera, or who can't enjoy a beach fully because he doesn't own property near it. The healthy person enjoys the pleasures of today knowing that tomorrow will be different in some way and hence worthy of being met. To return once again to Pasatiempo: the addict wastes water during a shortage because he wants to get his before it runs out. For the life-loving person, water can be shared during a shortage because there are so many other things in great supply. The wealth addict can't stop looking at what's missing and hence never sees all the other things that have arrived. ●

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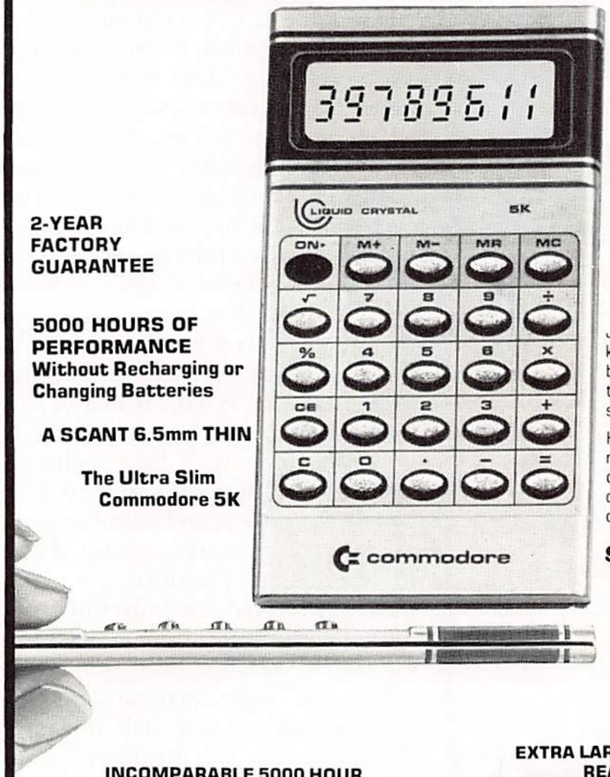

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PROFESSOR OF WONDERMENT Continued from page 32

about them with lyrical awe and talks of them with fascinated affection. "Every day there's some exchange—you could call it empathy. They engage in context-aware behavior, like deceit, and they show altruism toward each other and toward us, which is very exciting. They're terribly forgiving when you do dumb things. And they like to play tricks on each other and on you. They'll splash you, and"—Ken rolls his eyes portentously—*"how the hell do they know you're dry?* Hmmm?" But the next question really knocks me over: "Imagine looking up through the wavy surface and seeing a *person!* What's it like to *be* a porpoise?"

I never thought I'd hear a scientist say anything like that. But to Ken Norris, "intuition and wonderment" are at the very heart of science. He is forever saying, "You mustn't get your own ego involved, you must throw out all your mistaken notions—*the specimen is the authority.*" But you don't throw out your imagination. Disciplined and cleared, it is the most direct route to the truth—the consummate instrument for apprehending another creature's reality.

"It's important to get off your perch as a human. Think like a bug, imagine you're a lizard, wonder what it's like up a tree for a bird—or what if you were the tree itself?" We are standing at Tioga Pass in the Sierra, 9,900 feet up, and Ken, in old plaid shirt, baggy pants, and a red GMC Trucks cap, is giving one of his "sermons." The text is "ways of seeing," which is Ken's way of saying that there are as many versions and visions of the world as there are living beings. I think of William Blake's words, "How do you know but ev'ry Bird that cuts the airy way, / Is an immense world of delight, clos'd by your senses five?" These alien "worlds of delight," Ken is saying, need *not* be closed to an imagination served by the senses in "the method of refined observation: focusing down and down on details until you arrive at a whole new understanding of the conditions of life for a given organism."

He provokes his students to a demonstration. Why does the ponderosa pine succumb to frostbite at very high altitudes, while the whitebark pine survives? What is it about this bent and tangled tree that adapts it so well to extreme cold: the flexible twigs that bow under the weight of snow, the bunches of needles at twig-tips that trap snow or warm air for insulation, natural antifreezes in its sap? Ken coaxes and listens—he is an intent, self-effacing listener—and his students put forward idea after idea that never would have occurred to me. I begin to recognize another function of the disciplined imagination: to question the obvious. My own perception of nature will never again be so complacent and vague.

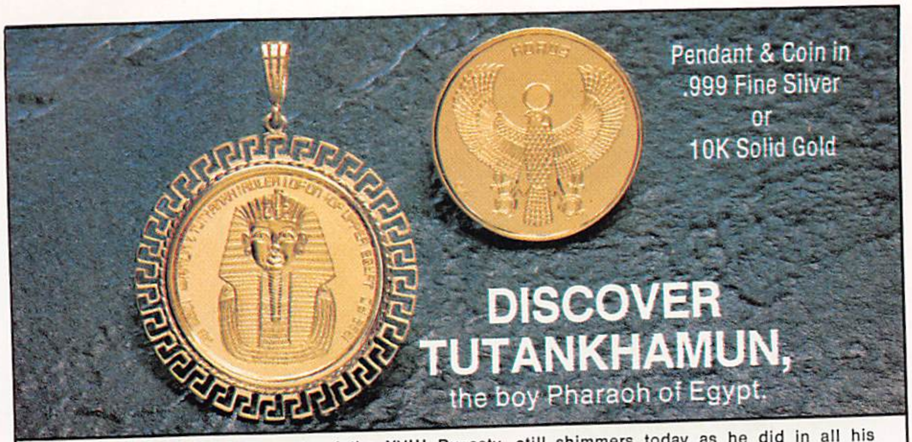
Down in the lush Tuolomne River Canyon two days later, I watch Ken send his students off to detect the minute convection currents that rise from rocks or filter through pine needles, to measure the temperature differentials between earth's surface and the air one inch above it, between dark rock and light, and then to consider how intimately these "micro-

climates" shape local life. "When you get down to a little rinky-dink thing like this beetle, I think the whole world changes when convection changes." The students scatter on their investigations, a third of them stark naked—it looks like science in Eden—while Ken watches from a rock in the sun. "How are you?" "Oh, I'm just sittin' here full of joy."

He is constantly *looking*, gently, unobtrusively, just making conversation: "Is that a digger pine? The cones look too small. . . . Which is the boy and which is the girl, or don't they do that?" A grackle eases into the pine without stirring a needle. "Isn't *that* beautiful! What a neat bird. . . . Look, a rock mortar!" I have been sitting obliviously beside the hollow in the granite where Chumash Indian women ground acorns and gossiped a hundred years ago. Nothing, but nothing, escapes Ken's attention and wonder, least of all his students: "So many personalities in here with so much going for them, such capabilities. . . . She's so bright, and he's so . . . wow!" And watching them, he is moved by another aspect of the "new ethic": "It's not like in my day. It's more natural, and they're better friends. One of the things that impresses me is that now people can really love each other. You didn't used to be able to do that without signing a contract. Now everyone can *be* with everyone else. It's one of the reasons I react so strongly to a group like this, get so full of joy."

There's a lot of joy on this trip: in the day's science with its heady mixture of exuberance and precision, in the night's hilarity around the campfire, where Ken leads a wild, impromptu rhythm section on a washtub bass made from a five-gallon tin. It is the last field trip of the semester, and at its end Ken, three days unshaven, reads aloud from his journal in a circle of students, then becomes the nucleus of a staggering 15-person hug. He has shown them "how to *see*, which is what I have to pass on." He has shared with them his hardheaded, wide-eyed wonder at the way things are. "I'm hoping to hang on to the spirit of inquisitiveness, the sense of wonder that pervaded the class," wrote one student later. "Ken carries that spirit and exudes it. May I carry it with me, too."

Or, as Ken put it: "I thought it was kinda neat." ●



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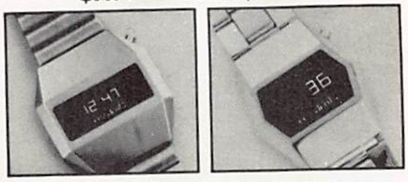

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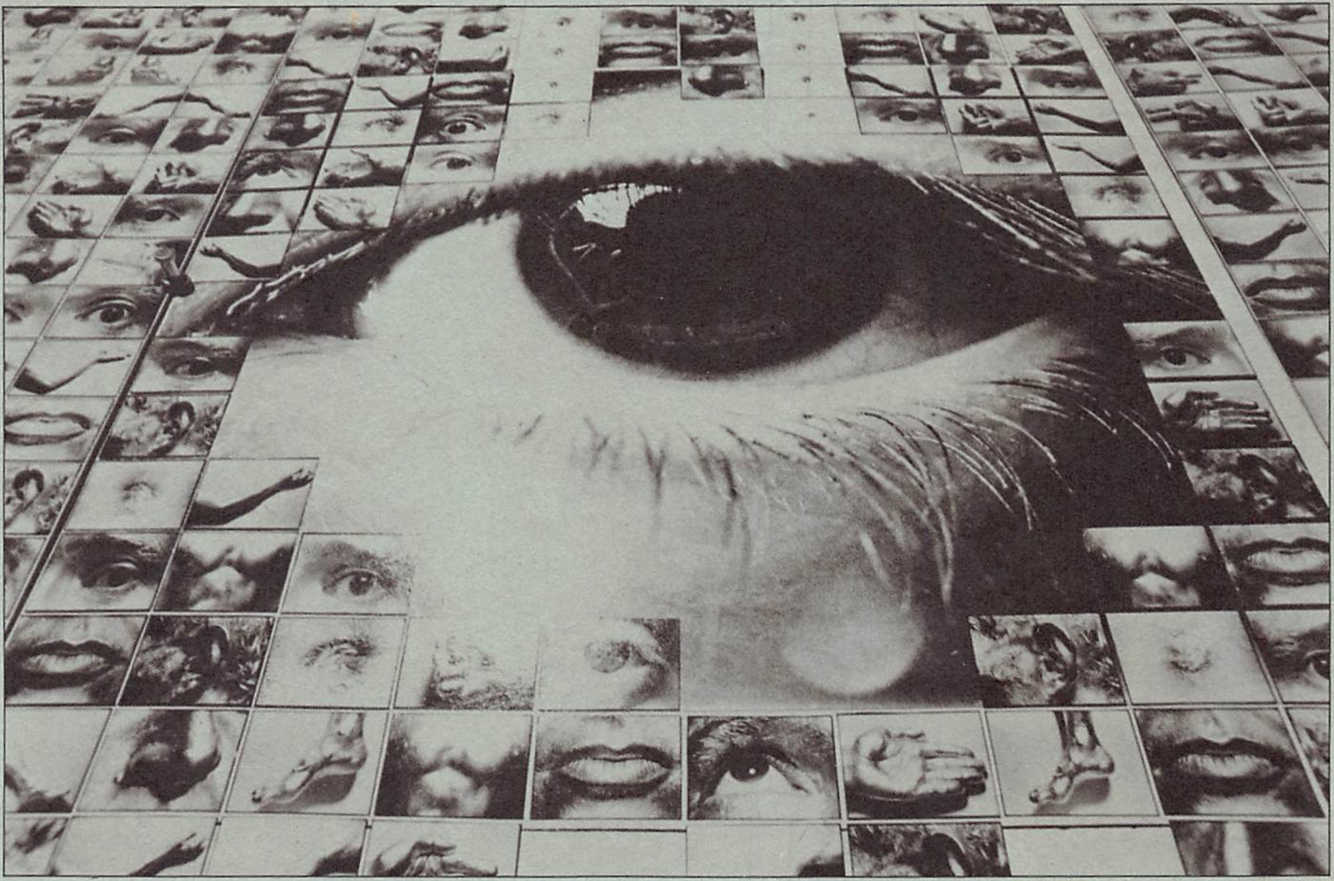


TETSU OKUHARA

IN MEMORY'S EYE

EDITED BY TONY JONES

Memory is notoriously unreliable. As policemen and psychologists know, eyewitnesses to events confidently recall things that never happened. One time or another, most of us have stood by helplessly while our own memories pulled disappearing acts, leaving us rummaging for a familiar phone number or staring blank-faced and embarrassed at a person we have just been introduced to and are now expected to introduce to others.

Still, we trust ourselves to memory, and happily. Knowing its quicksilver quality, the failures only serve to make the achievements more impressive.

Attention is half the game: recording an event must precede recalling it. But there are also many tricks of the trade, so to speak, ways to make memory work for you. It helps to know that memory is sometimes like night vision, slightly off center, so that a distant train of association can lead directly to a lost fact. Or that physical movement distracts memory (the best way to remember a dream is not to move as you wake up; if you have moved, slowly resume your waking position). Or that you can remember lists of things by fashioning the items into a series of foolish cartoonlike images that will stick in the mind like burrs.

Mnemonics—packaged popularly as common-sense guides to memory improvement—provides tricks for mastering memory. One lesson from the self-improvement field is that the human memory, properly conditioned, is capable of far more than we ask of it in everyday life. With certain natural gifts added in, the human memory is capable of prodigious feats.

But eventually the trick turns the other way: it is memory that has power over us, not we who have power over it. Memory is above all the mechanism that makes us creatures of time. Without it, we would move in an eternal present unmarked by anxiety over past or future. And that's not all of it. Memory also holds us in, caught in our own frame of reference. Here is the territory of ultimate relativity, a place where the observer and the event are collapsed into a single phenomenon.

The following pages look at memory many different ways. But the best way to learn about memory is to watch your own at work. Incidentally, if you run across anything here you want to remember, repeat it three times while standing on your head. Then it should sink in.

A Man Who Cannot Remember

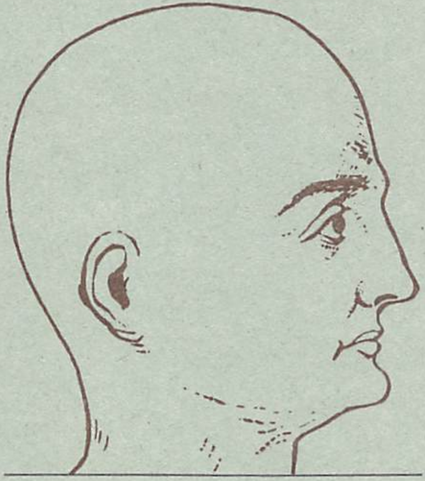
He is known clinically as H.M. He is 51 years old and lives in New England with his mother. Ever since a 1953 brain operation he has been unable to form new memories. His world appears fresh to him every moment. He never knows the day of the week, the year, his age.

Brenda Milner of the Montreal Neuropsychiatric Institute has followed H.M.'s case over more than 20 years. These observations concerning the degree of H.M.'s handicap are drawn from several of her articles in the professional literature.

The patient was drowsy for the first few postoperative days, but then, as he became more alert, a severe memory impairment was apparent. He could no longer recognize the hospital staff, apart from Dr. Scoville himself, whom he had known for many years; he did not remember and could not relearn the way to the bathroom, and he seemed to retain nothing of the day-to-day happenings in the hospital. At the same time, it was discovered that he had an extensive, though patchy, retrograde amnesia, such that he did not remember the death of a favorite uncle three years before, nor anything of the period spent in hospital before the operation, but he did recall a few trivial incidents that had taken place just before his admission to the hospital. His early memories were seemingly vivid and intact, his speech was normal, and his social behavior and emotional responses were entirely appropriate.

◆

His condition [14 years later] has remained essentially the same, although our interval history (based on home visits and a two-week hospitalization for more intensive study) reveals some very slight improvement, remarkable perhaps only because it seemed to occur at such a late date. The central feature of the amnesia continues to be a failure in long-term retention for most ongoing events, in the absence of any general intellectual loss or perceptual disorder. The lack of intellectual deterioration is underscored by the fact that on standard tests of intelligence H.M. does better now than before the operation, and that his performance on such tests, as also on special tests of sorting and categorizing, is above average.



◆

His mother states that he is unable to learn where objects constantly in use are kept; for example, although he mows the lawn regularly, and quite expertly, she still has to tell him where to find the lawn mower, even when he has been using it only the day before. His mother also observes that he will do the same jigsaw puzzles day after day without showing any practice effect, and read the same magazines over and over again without ever finding their contents familiar. The same forgetfulness applies to people he has met since the operation, even to those neighbors who have been visiting the house regularly for the past six years. He has not learned their names and he does not recognize any of them if he meets them in the street. Conversely, he cannot now be left alone in the house because he has been known to invite total strangers in to await his mother's return, thinking they must be friends of the family whom he has failed to recognize.

◆

On one occasion, H.M. was asked to remember the number 584 and was then allowed to sit quietly with no interruption for 15 minutes, at which point he was able to recall the number correctly without hesitation. When asked how he had been able to do this, he replied:

"It's easy. You just remember 8. You see, 5, 8, and 4 add to 17. You remember 8; subtract it from 17 and it leaves 9. Divide 9 in half and you get 5 and 4, and there you are: 584. Easy."

In spite of H.M.'s elaborate mnemonic scheme, he was unable, a minute or so later, to remember either the number 584 or any of the associated complex train of thought; in fact, he did not know that he had been given a number to remember, because in the meantime, his attention had been diverted to another topic.

◆

One gets some idea of what such an amnesic state must be like from H.M.'s own comments, repeated at intervals during a recent examination. Between tests, he would suddenly look up and say, rather anxiously,

"Right now, I'm wondering. Have I done or said anything amiss? You see, at this moment everything looks clear to me, but what happened just before? That's what worries me. It's like waking from a dream; I just don't remember."

The Cliché Problem

The processes of memory thus substitute the conventional cliché for the actual experience. It is true that the original experience or perception usually is already, to a large extent, determined by conventional cliché, by what the person expected to see or hear, which means by what he has been taught to expect. However, everybody who has paid attention to these processes in himself and others can observe that there is, especially at first, some awareness of the discrepancy between the experience itself and the thought or words which articulate, preserve, and express it. The experience is always fuller and richer than the articulate formula by which we try to be aware of it or to recover it. As time passes, this formula comes to replace more and more the original experience and, in addition, to become itself increasingly flat and conventionalized.

Memory, in other words, is even more governed by conventional patterns than are perception and experience.

—Ernest G. Schachtel, *Metamorphosis*, 1959 (Basic Books Inc., N.Y.)

At Ohio Wesleyan University several hundred subjects were tested on their recall of high school classmates. Graduates 15 years out of high school could identify by name 90 percent of their classmates' pictures, and even those nearing their fortieth or fiftieth reunion recognized 75 percent of classmates' faces. Although prompting with yearbook pictures produced the best results, the researchers found that recent graduates usually could name several dozen classmates off the top of their heads, while older subjects remembered 19 names on the average without prompting.

A Man Who Could Not Forget

The man, a Russian mnemonist, is known in the literature as S. He was born with an extraordinary capacity to generate vivid intense imagery of anything presented to him for recall. He could cite back a list of 70 numbers or words or nonsense syllables in proper order forward or backward.

S. once memorized the nonsensical mathematical formula shown here.

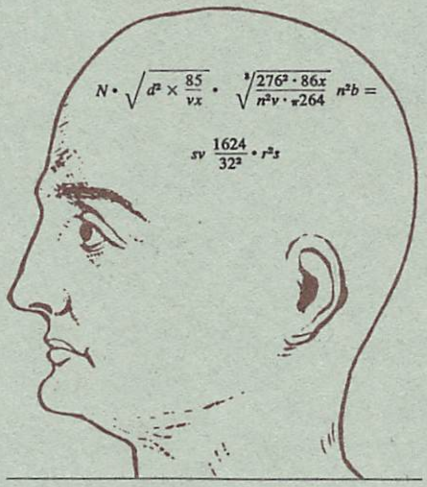
Fifteen years later, he was not only able to reproduce the formula with no errors, but was still able to trace his pattern of recall in precise detail—even though he had no warning he would be tested on it.

S.'s case was studied over nearly 30 years by A. R. Luria, who summarized his observations in an elegant small book, *The Mind of a Mnemonist*. At one point, he describes S.'s inability to forget, alternating his own commentary with entries from notes that S. furnished regarding his mental states.

S. frequently gave several performances an evening, sometimes in the same hall, where the charts of numbers he had to recall were written on the one blackboard there and then erased before the next performance. This led to certain problems, which he described as follows:

I'm afraid I may begin to confuse the individual performances. So in my mind I erase the blackboard and cover it, as it were, with a film that's completely opaque and impenetrable. I take this off the board and listen to it crunch as I gather it into a ball. That is, after each performance is over, I erase the board, walk away from it, and mentally gather up the film I had used to cover the board. As I go on talking to the audience, I feel myself crumpling this film into a ball in my hands. Even so, when the next performance starts and I walk over to that blackboard, the numbers I had erased are liable to turn up again. If they alternate in a way that's even vaguely like the order in one of the previous performances, I might not catch myself in time and would read off the chart of numbers that had been written there before.

How was S. to deal with this? During the early stages, his attempts to work out a technique of forgetting were of an extremely simple nature. Why, he reasoned, couldn't he use some external means to help him forget—write down what he no longer wished to remember. This may strike others as odd, but it was a natural enough conclusion for S. "People jot things down so they'll remember them," he said. "This seemed ridiculous to me, so I decided to tackle the problem my own way." As he saw it, once he had written a thing down, he would have no need to remember it; but if he were without means of writing it down, he'd commit it to memory.



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Writing something down means I'll know I won't have to remember it. . . . So I started doing this with small matters like phone numbers, last names, errands of one sort or another. But I got nowhere, for in my mind I continued to see what I'd written. . . . Then I tried writing all the notes on identical kinds of paper, using the same pencil each time. But it still didn't work.

He went further and started to discard and then burn the slips of paper on which he had jotted down things he wished to forget. Here for the first time we have evidence of something we shall have occasion to return to later in this account: that S.'s richly figurative imagination was not sharply cut off from reality; rather, he turned to objects in the external world when he needed a means to work out some mental operation.

The "magical act of burning" he tried proved of no use to him. And after he had burned a piece of paper with some numbers he wanted to forget and discovered he could still see traces of the numbers on the charred embers, he was desperate. Not even fire could wipe out the traces he wanted to obliterate!

The problem of forgetting, which had not been solved by his naive attempt to burn his notes, became a torment for him. Just when he thought a solution was unattainable, however, something occurred which proved effective, though it remained as unfathomable to him as it did to those of us who were studying him.

One evening—it was the 23rd of April—I was quite exhausted from having given three performances and was wondering how I'd ever get through the fourth. There before me I could see the charts of numbers appearing from the first three performances. It was a terrible problem. I thought: I'll just take a quick look and see if the first chart of numbers is still there. I was afraid somehow that it wouldn't be. I both did and didn't want it to appear. . . . And then I thought: the chart of numbers isn't turning up now and it's clear why—it's because I don't want it to! Aha! That means if I don't want the chart to show up it won't. And all it took was for me to realize this!

From *The Mind of a Mnemonist* by A. R. Luria, translated from the Russian by Lynn Solotaroff. Copyright © 1968 by Basic Books Inc., N.Y.

General Tendencies

According to Donald and Eleanor Laird in their book called *Techniques for Efficient Remembering*, these are the things we are all most likely to remember and forget.

WE USUALLY FORGET

- Names (of things as well as of people)
- Numbers and dates
- Unpleasant things
- What is learned barely enough to remember it
- Facts at odds with our beliefs and prejudices
- What we learn by cramming
- Our failures
- What we pick up incidentally without trying to remember it
- Things we think of only once or twice after remembering them
- Material we don't understand
- What we try to remember when embarrassed, frustrated, in poor health, or fatigued.

WE USUALLY REMEMBER

- Pleasant experiences
- What we review before going to bed
- Things that seem to us worth remembering
- Things we talk about often
- What we give time to sink in before going further
- Long or difficult material we stretch ourselves to learn
- Material we review, or think about often
- Facts and topics that interest us
- Our successes
- Material that makes sense to us
- Memories tied in with muscular skills
- What we use most frequently
- What we had a motive to remember for a long time when we were first learning it.

WISCONSIN HISTORICAL SOCIETY

The place is Black River Falls, Wisconsin, the time between 1890 and 1910. Charles Van Schaick, the town photographer, took more than 30,000 pictures in those years, documents that spoke of the people and the period. Before Van Schaick's glass negatives crumbled into dust, 3,000 pictures were saved by the Wisconsin Historical Society. In 1973, a portion of the collection was printed in Michael Lesy's book Wisconsin Death Trip, *from which the photos on this and succeeding pages have been taken.*

Old Jack's Last Memories

When he moved to town he knew the last of his life's hinges had turned. It seemed to him then that he was finished. Because he had no descendant of both mind and blood, his own descent had become wayward; it had led him out of his homeland into exile. Having no longer the immediate demands of his place and work to occupy his mind, he began to go into the past. His place and his life lay in his mind like a book and what is written in it, and he became its scholar. His thoughts went back to his place and moved obsessively over it, whether in the pleasure of familiarity or in the pain of old reminding. His mind was formed long before the days when maps were commonplace, and even longer before the time of aerial views and photographs. His memory of his place was never overlooking and abstract, but ground-level, as immediate always to his hand as to his eye. It was unified in his mind not by the geographical relationships of its various boundaries and landmarks but by his old routes over it, its aspects opening ahead of him as he ascended heights of the ground or emerged from trees, moving over it in his memory on horseback or behind a team or on foot.

"Don't you want to go in there and watch the TV?" Mrs. Hendrick asks.

He shakes his head. "No," he thinks. "Hell's fire no." For the *cost* of living beyond his time is in putting up with the various noises and contraptions of these new times, this modern ignorance, as he has come to call it in his mind. The modern ignorance is in people's assumption that they can outsmart their own nature. It is in the arrogance that will believe nothing that cannot be proved, and respect nothing it cannot understand, and value nothing it cannot sell. The eyes can look only one way, and Old Jack believes in the existence of what he is not looking at and what he does not see. The *next* hard time is just as real to him as the last, and so is the next blessing. The new ignorance is the same as the old, only less aware that ignorance is what it is. It is less humble, more foolish and frivolous, more dangerous. A man, Old Jack thinks, has no choice but to be ignorant, but he does not have to be a fool. He can know his place, and he can stay in it and be faithful.

—Wendell Berry, *The Memory of Old Jack*, 1974 (Harcourt Brace Jovanovich, N.Y.)

Life Review Therapy

The life review is a universal mental process brought about by the realization of approaching dissolution and death. It marks the lives of all older persons in some manner as their myths of invulnerability or immortality give way and death begins to be viewed as an imminent personal reality. The life review is characterized by the progressive return to consciousness of past experiences and, particularly, the resurgence of unresolved conflicts.

The tendency of older persons to reminisce about the past has often been dismissed derogatorily as living in the past, second childhood, or senility or, somewhat more sympathetically, as an expression of loneliness, absence of new experience, or tenacious clinging to a previous identity. It is regarded as boring, time-consuming, and meaningless. But the predilection toward reminiscence appears to have a much more positive function, a psychotherapeutic one, in which the older person reflects on his life in order to resolve, reorganize, and reintegrate what is troubling or preoccupying him.

In its natural state, the life review is spontaneous, often quite unselective, and occurs in younger persons as well (for example, in adolescence, in middle age, and in the face of death). However, it takes on a striking intensity in early old age. Older persons comment with surprise on their ability to recall previous life events with sudden and remarkable clarity: "It's as though it happened only yesterday," "I felt as though I was there." They may have memories of smell, taste, and feel as well as sight and sound. The capacity for free association seems to be renewed, bringing up memories deeply buried in the unconscious.

Some persons are fully aware of the process and openly state a desire to "put my life in order," while others are only dimly conscious of something compelling them to muse about the past. Still others are totally unaware, perhaps in an unconscious attempt to avoid the pain of unpleasant memories or to protect themselves against the stereotype of living in the past.

The emotions accompanying the life review vary, but an element of pain and discomfort often arises as problems surface. The intensity of the experience may range from a mild nostalgia, reminiscing, and storytelling to a feverish preoccupation, sometimes centered on a particular subject.

—Robert N. Butler and Myrna I. Lewis in *Geriatrics* magazine, November 1974

Waiting for the Time Machine

In certain favorable moods, memories—what one has forgotten—come to the top. Now if this is so, is it not possible—I often wonder—that things we have felt with great intensity have an existence independent of our minds; are in fact still in existence? And if so, will it not be possible, in time, that some device will be invented by which we can tap them? I see it—the past—as an avenue lying behind; a long ribbon of scenes, emotions. There at the end of the avenue still, are the garden and the nursery. Instead of remembering here a scene and there a sound, I shall fit a plug into the wall; and listen in to the past. I shall turn up August 1890. I feel that strong emotion must leave its trace; and it is only a question of discovering how we can get ourselves again attached to it, so that we shall be able to live our lives through from the start.

—Virginia Woolf, *Moments of Being*, 1976
(Harcourt Brace Jovanovich, N.Y.)

The Journal as a Self-Recording Device

by Nancy Evans

The absurd feeling of displacement so many people complain of today—the not knowing why you said what you said or why you acted the way you did—may come from not taking the time to grasp some strings of personal past to anchor yourself. We spin on the axis of today-is-the-first-day-of-the-rest-of-your-life and can barely remember what happened the day before yesterday, or why.

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Life without some connective tissue secreted by the power of association is not much more than a string of one-night stands. Here's the journal writer's ground, the belief that life tasted twice, in the moment and in retrospection, brings out the full flavor of its meaning. In the process of writing to yourself, déjà-vu-like, you can sometimes recognize what you already know. When that happens—as any journal writer will tell you it does—there is a shiver of catharsis, a glimpsed self-reflection a hundred times stronger and more vivid than any identification you've ever felt with a character in a book or a movie.

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Building up personal significance from the past takes time. This is why the fast-image processors, for all their showy appeal, often end by disappointing. There is lively commerce in the trendy instruments of self-reflection: cameras, tape recorders, instant replay, video, even therapy sessions. Recently there has been a surge of low-cost popular guides to carry one safely through the thickets of genealogy to a family tree. You can pay for and get any number of past-on-demand services. But you can't get out more than goes in. None of it provides satisfying answers to the puzzles of who we are and why we behave the way we do. None of it quite compares to the act of keeping a personal journal over a long period.

Layers of experience have to be deposited, compared, juxtaposed before we can see that certain events repeat themselves, that cycles gradually emerge. Otherwise we go on fooling ourselves with the boiled-down stories we hand out by way of introduction. We need to pierce through the layers of personal myth to locate things that can set a segment of our personal histories straight. Until there's a machine to replay our pasts (and even then, would its facsimile resemble what we'd construct ourselves?), the best strategy is to be a self-recording device.

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Fallible and time-consuming as a journal may be, most of the time it actually works. The writing is its own reward. Like a list of things to be done or a letter to a friend, it's an attempt to make sense out of your life that shows its own result. The document itself provides a luscious sense of mastery, of being able to order yourself and the world around you. Over time, the journal prolongs the moment of self-connection. Gradually it expands into a hall of mirrors where you view and review yourself. The reflections there fit you alone, and that's the beauty of it.

Nancy Evans helped with this issue of Potentials.

Family Taboos

We have "gotten permission" to carry memories with us in large extent from our families, according to how memory was valued when we were children and from the decisions we made ourselves whether or not to remember, for example, things that were painful or discounted by adults, or messages that lowered our self-esteem. We may ask ourselves these questions about memory:

- How far back do I easily remember?
- Were memories treated as important in my family? Did we spend time remembering together?
- Who took major responsibility for carrying family memories? How did that person assume the responsibility?
- How did I fit into the remembering process?
- Were there restrictions about what was acceptable to remember?
- How were such memory taboos enforced?

There is much information packed around the answers to these questions. Our response may be a floodgate, opening us for the first time to the observance of life-tracking. We can record information quickly without stopping to censor or process. Later this raw data is at our disposal in journal work. This primary memory work strikes the tip of the personal and family myth. Personal myth consists of all the stories we tell each other about ourselves. These are most often colored by an unconscious absorption of cultural and family guidelines regarding memory and the responses of others when we have revealed our thoughts and feelings.—Christina Baldwin, *One to One: Self-Understanding Through Journal Writing*, 1977 (M. Evans, N.Y.)

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Electronic Memory

by DONALD CHRISTIANSEN

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Consider a laboratory mouse wending its way through a geometrical maze. What decisions does it face and make? What part does memory play? How does it avoid repeating the mistake of heading up a blind alley?

If the options faced by the mouse at each turn could be reduced to clear instructions (turn right or turn left), then the live mouse could be replaced by a mechanical mouse, which itself could be programmed to sense standard situations ("I have reached a dead end") and react appropriately. Just as in the case of the live mouse, a mechanical one would have to return to the point of its previous decision, and choose another option.

The avoidance of repeating a mistake suggests the presence of some form of memory. In other words, the mistake would have to be recorded, so that the mouse could retrace its path to the point at which the wrong decision was made.

It happens that, with present technology, such a mechanical mouse can be built; it would contain a small computer complete with the memory necessary to assist the mouse through the maze. Just a few years ago, a self-contained "thinking" mouse would not have been possible. Indeed, in 1951, Claude Shannon, the developer of "information theory," designed and constructed a machine that was capable of solving a maze by trial-and-error means, of remembering the solution, and also of forgetting it in case the solution was no longer applicable.

Instead of a mouse, Shannon had to use a sensing finger which felt the partitions of the maze. The finger was mounted on an overhead arm and was moved by two motors ("east-west" and "north-south"), and about 75 relays served as the logic and memory elements. In those days, since the electronics was so bulky, everything except the finger had to be outside the maze.

While computer memories can be used for both simpler and more complex problems than that of the mouse and maze, they are all based on the same principle, that of recording or storing a small bit of information in one of two states. You could construct a simple two-state memory element to remind you that you had carried out an errand, for example. It could be a plain three-by-five card. After you took care of the errand, you'd punch a hole in the card. Later, by looking at the card, you'd be able to recall whether or not you'd done the errand. Hole, yes. No hole, no.

This example may sound like merely a slightly more sophisticated version of the "tie a string around your finger" routine, and it *is.* Anything from the proverbial string to a sensitized area on a magnetic drum, disk, or core or an electronic signal in a tiny semiconductor circuit could be construed as a memory element. Computer people usually think of memory either as main working memory (internal to the computer) or as mass bulk storage (external to the computer but rapidly accessible). The former are usually core or semiconductor memories, while the latter are often drum or disk memories.

The workhorse memory element of early computers was a tiny magnetic doughnut which assumed one of two states ("one" or "zero," in computer parlance) by passing an electric current through a wire woven through the doughnut's hole. Which state such an element assumes depends on the direction of the current. When the state of the element is to be accessed or read, a current is sent through a second wire passing through the doughnut. Generally, the information content in a memory element resides not only in its one or zero state, but also in its site within the overall memory format. It also turns out to be a useful characteristic of some types of memories that they are unerasable (read only), and of others that they are erasable (new information can be stored).

Aside from helping record errands, a single memory element is not very useful. Memories for worthwhile computer applications contain thousands, or even millions, of elements, or bits. However, some types of memory—for example, magnetic cores—though inexpensive, take up a lot of room. One could not conceive of putting such a memory inside a mechanical mouse or a digital watch.

Psychologist Harold Burtt conducted the following intriguing experiment. When his son was two years old, Burtt read him three passages from Sophocles. Of course the child could not understand a word of the readings. Then, when the child was eight years old, Burtt gave him the same three passages to memorize, plus three new passages. It took 435 repetitions for the child to learn the new material, but only 317 repetitions to learn the passages read to him years before.

Memories for such applications would have to have a very much greater bit density (lots more memory elements in a given space). So today some form of solid-state memory is needed when compact, fast local memory is required, although plenty of ferrite cores remain in service for large central processing applications.

Memory specialists have developed a variety of electronic memories, the acronyms for which would fill a small dictionary. An EBAM, for example, is an electronic beam accessed memory—something like a small TV tube that

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Donald Christiansen is editor of Spectrum, *the magazine of the Institute of Electrical and Electronics Engineers.*

shows no image. One of the few non-acronym memories is the intriguingly named bubble memory. In this case, the one and zero states are represented by the presence or absence of a tiny magnetic region or bubble that circulates within a small memory chip.

One solid-state logic and memory chip for an electronic watch built by Texas Instruments is not much larger than an eighth of an inch on a side. A quartz crystal inside the watch vibrates at a highly uniform rate. The chip counts the vibrations and when 32,768 have been counted, the memory advances one second. It next counts the seconds, the minutes, and the hours, and stores this information so that at the push of a button the correct hour and minute are displayed. At the end of 24 hours, the memory advances the date by one day. It also recognizes months having 30 and 28 days, and after counting through 12 months, recognizes the passage of a year and goes back to January 1.

Computer scientists may label simple exercises like this "trivial." Trivial mathematically, perhaps, yet the real accomplishment lies in the technology that permits such an operation to be carried out within a minuscule space. It is this "microprocessing" capability that suggests hitherto impossible uses of even tinier and less expensive semiconductor logic and memory devices.

Recently, a waggish prognosticator chuckled as he predicted that the citizen of the future would have an armful of electronic devices strapped on from wrist to elbow. But is he laughing still? Hewlett-Packard at midyear astounded consumers with a digital wristwatch that provides the time, plus alarm, and is also a timer and stopwatch, calendar, *and* calculator (it adds, subtracts, multiplies, and divides, and performs various serial and repeat operations). Most of the watch's 28 keys are operated by using a stylus.

One can merely speculate on the applications of microprocessors in uses more closely linked with the human body itself—as in medical prostheses.

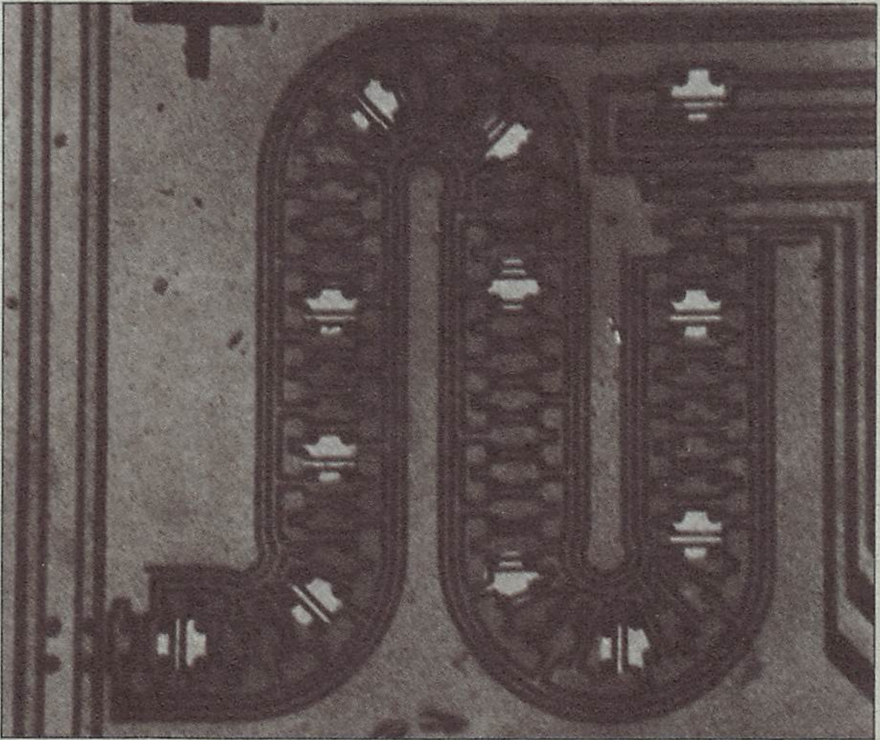
Ideas that seem novel but remote may well appear in product catalogues that arrive in tomorrow's mail. Many consumer-oriented devices will be put on the market simply because logic and memory can be incorporated into one chip at such a low cost that the "personal cost threshold" is not exceeded for the finished product. (Some marketing experts believe this threshold to be about $100, yet it can be higher depending upon the nature of the product and what the customer perceives its intrinsic value to be.) One such product, just recently introduced, is a bicycle exerciser manufactured in West Germany. A microprocessor/memory monitors heart rate, controls pedal loading, and calculates calorie loss while the user operates the exerciser. In a more frivolous vein, it is easy to envision many yet-to-be-marketed aids to routine creature comfort. One might be an automatic shower temperature controller that is multiprogrammable to match the preference of each member of the household.

> Boy, I hadn't had a skate key in my hand for years. It didn't feel funny though. You could put a skate key in my hands 50 years from now, in pitch dark, and I'd still know what it is.
>
> —J. D. SALINGER in *Catcher in the Rye*

The ease with which logic and memory can now be distributed to local sites suggests the extension of local memory banks servicing specific needs or geographical locations (for insurance companies, for example) as opposed to the centralizing of data bases at enormous single-site facilities. Another use of the microprocessor, already begun on a modest scale, is text editing. Large numbers of newspapers and periodicals will abandon the conventional typewriter in favor of cathode-ray-tube and computer input keyboards, and rewriting and editing will be done by means of the keyboard and a light pen or pointer that can be directed to information displayed on the face of the tube. Eventually, direct speech (voice) input to the computer could largely supplant the need for the keyboard.

The notion of voice recognition by computer also has broad implications for electronic banking, credit clearance, and shopping from the home. Thus, the telephone will become an important partner in linking the human operator with information stored in and accessible from machine memory. Further, voice-input diaries and journals could provide personal-history and accounting systems for the individual citizen who otherwise might feel too harried (or disorganized) to put pen to paper. Such a personal system could, for example, contain a program for keeping income tax records and running "trial balances" at will during the year.

To conclude on a happier and, perhaps, more socially responsive note, the microprocessor could, and most probably will, be harnessed to control in an optimum way the expenditure of the globe's limited energy resources. For example, in the case of automobiles, gasoline consumption will be trimmed by keeping engines continuously tuned by means of on-board processors operating in "real time." And in the case of homes and commercial buildings, programs will automatically sense environmental conditions and occupancy factors and control the heating and air-conditioning systems accordingly.

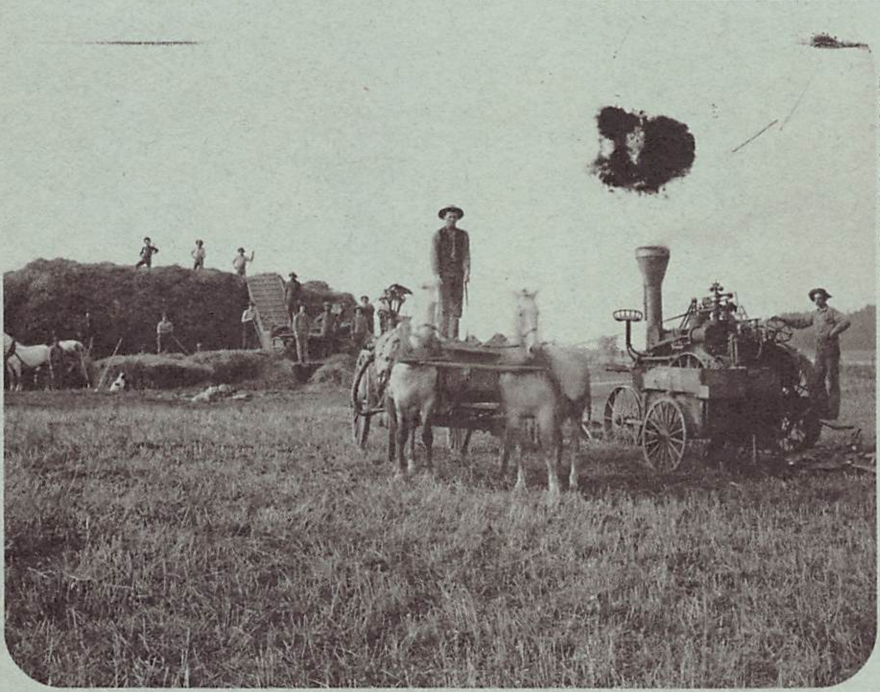


Bubble "domains" (bright spots) circulate through a shift-register memory fabricated by Bell Laboratories. This form of memory is used for temporary storage of information such as a partial result in a mathematical operation.

Psychologists Confused After Meeting

What is likely to happen in reporting a meeting is illustrated in the results of an experiment reported by two Cambridge psychologists, J. Blackburn and E. J. Lindgren. Without the knowledge of the people present, they made a recording of the discussion which followed a meeting of the Cambridge Psychological Society. Two weeks later, they wrote to all those who had attended and asked them to write down all they could recall about this discussion. When the reports were received, they were checked against the recorded version and it was found that the average number of specific points recalled by any individual was only 8.4 percent of the total recorded. However, the really remarkable thing about these recalled points was that, on the average, no less than 42 percent of them were substantially incorrect. A large variety of errors and confusions appeared. Happenings were reported which had never taken place at all or which had taken place on some other occasion and were wrongly recalled as having occurred at this particular discussion.

—Ian M. L. Hunter, *Memory*, 1964 (Penguin Books, Baltimore)



WISCONSIN HISTORICAL SOCIETY

Adrift in a Sea of Information

What we should be most afraid of, perhaps, is the fact that, since the invention of printing, magnetic tape, and computer cards, the Collective Mind has lost the vital ability to *forget.* A principal task for us lies in the organization of knowledge for ready access. This problem is nowhere more acute than in science itself, where the sheer accumulation of facts threatens to impede rather than to assist the progress of new ideas.

Already the technology that supports everyday life in the developed world has become so complex that no single mind can understand it. Man might not go out with a bang of his own creation, nor freeze his race to death by stealing the energy resources of the earth. He might merely drown himself in a flood of information; society could collapse because it no longer comprehends its own cultural inheritance.

—Colin Blakemore, *Mechanics of the Mind*, 1977 (Cambridge University Press, N.Y.)

We all have some experience of a feeling, that comes over us occasionally, of what we are saying and doing having been said and done before, in a remote time—of our having been surrounded dim ages ago, by the same faces, objects and circumstances—of our knowing perfectly what will be said next, as if we suddenly remembered it.

—Charles Dickens in *David Copperfield*

Organize, Organize: Collect the Bits Into Chunks

Since the memory span is a fixed number of chunks, we can increase the number of bits of information that it contains simply by building larger and larger chunks, each chunk containing more information than before.

A man just beginning to learn radiotelegraphic code hears each *dit* and *dah* as a separate chunk. Soon he is able to organize these sounds into letters and then he can deal with the letters as chunks. Then the letters organize themselves as words, which are still larger chunks, and he begins to hear whole phrases. I do not mean that each step is a discrete process, or that plateaus must appear in his learning curve, for surely the levels of organization are achieved at different rates and overlap each other during the learning process. I am simply pointing to the obvious fact that the dits and dahs are organized by learning into patterns, and that as these larger chunks emerge, the amount of message that the operator can remember increases correspondingly. In the terms I am proposing to use, the operator learns to increase the bits per chunk.

In the jargon of communication theory, this process would be called *recoding.* The input is given in a code that contains many chunks with few bits per chunk. The operator recodes the input into another code that contains fewer chunks with more bits per chunk. There are many ways to do this recoding, but probably the simplest is to group the input events, apply a new name to the group, and then remember the new name rather than the original input events.

—George A. Miller, "The Magical Number Seven, Plus or Minus Two," *Psychological Review*, 1956

Remembrance Of Things (Far) Past

by Julian Jaynes

When we remember, we are allowed into an enchanted other world where the past is magically present and time becomes like a space. We are in an enormous space whose far boundaries merge indistinguishably into imagination on every side, a space full of forgetful shadows and obscuring twilights, of meanings that gleam with feeling, and bursts of accuracy that can support us, humiliate us, ennoble us, teach us. It is past and yet present. How is this possible?

This space, of course, is really a metaphor space, a something made to be like actual space, a mind-space generated by the metaphoric associations of the language we use to describe mental acts. Sometimes this spatialized time is a line or path perhaps, stretching from left to right. At other times it is a road yawning in front of us, or a huge darkened landscape we have just passed through. Or simply a spaceness that allows memories to be distinct. Note the necessity of the metaphors! It is an as-if space that becomes so absolutely necessary to our conscious decision-making, so real, so requisite to our efforts to find out who we are, that it often feels as real as the actual world, until the distinction blurs and we dream.

It has not always been so. The evidence of ancient writings and archaeology indicates that conscious memory only began around 1000 B.C.—a mere hundred generations ago. Before that time men and women moved about in an intellectual darkness through a more confined world with a different mentality—a bicameral mind. Decisions and remembering were not conscious, but heard from another part of the brain as auditory hallucinations called gods. There was no conscious remembering then.

> Everybody needs his memories. They keep the wolf of insignificance from the door.
>
> —Saul Bellow in *Mr. Sammler's Planet*

Ancient man did not live in a frame of past happenings and future possibilities as we do. He had no notion of a lifetime stretching between birth and death as we do. He worked his dark and brittle life through a strange and brilliant world of hierarchies and idols, commanded by divine voices from his own brain, unguessing of past or future. His was an eternal present untroubled by remorse or ambition, unlit by hope, untaught by regret or private thoughts.

The remembrance of things past begins in human history only as this bicameral mind breaks down. About three millennia ago, social chaos and catastrophe made this earlier mentality unworkable. And in the resulting agony of indecision, mankind learned on the basis of linguistic metaphor a new kind of mentality, consciousness.

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For the first time, a man could "know himself," could remember, not simply *know that* or *know how*. For the first time, he could "see" what he had done and grope for what he should do in a mind-space generated out of metaphor. For the first time, a man could plan better than the now-silent gods what to do in a future which—because he can now remember consciously—will be forever and ever different. For the first time, a man could make a quest of his life.

For the first time! How strange that sounds to us who use memory words so loosely that we impute remembering the past to animals when they simply know their names or mealtimes, or to infants when they know their parents, or to ourselves when we simply know a telephone number or a path home through the wood. We even speak of computers as having memories! You might as well say this page has a memory since it is storing information.

These are not ever remembrances of time past. They are learnings, habits, hook-ups, imprintings, mechanics that have no pastness about them whatever. The use of the term memory for such things is only metaphoric. Habits or learnings or information storages are *like* memories because they are dependent upon the past. But it is only we human beings, living during these last three millennia, who can reminisce upon our past lives, who can wander through this hidden kingdom where the past can be reexperienced.

But with this new ability to reexperience the past in a spatialized time, to remember and plan and narratize, comes a troop of new complications, some of which are still erupting into the difficulties of modern conscious life. Our innate genetically determined emotions that we share with most mammals are changed dramatically.

Shame remembered and fantasized in this reversible mind-time expands itself into guilt, something hugely more difficult to expiate or interpret. Sexual emotion was once confined to the presence of socially adequate stimulation; but with consciousness, with memory and fantasy, it becomes a much more prominent part of life. Fear and terror, once easily dissipated, stretch out into anxiety that can last a lifetime. And all because men can now automatically and even against their wishes reconstruct and hold as if present in this new spatialized time the unalterable experience of the past and its possibility in the future.

And nostalgia too. For with time metaphored as space, so like the space of our actual lives, a part of us solemnly keeps loitering behind, trying to visit past times as if they were actual spaces. Oh, what a temptation is there! The warm, sullen longing to return to scenes long vanished, to relive some past security or love, to redress some ancient wrong, or redecide a past regret, or alter some ill-considered actions toward someone lost to our present lives, or to fill out past omissions—these are artifacts of our new remembering consciousness. Side effects. And they are waste and filler unless we use them to learn about ourselves.

Memory is a privilege for us who are born into the last three millennia. It is both an advantage and a predicament, a liberation and an imprisonment. Memory is not a part of our biological evolution, as is our capacity to learn habits or simple knowings. It is an offshoot of consciousness acquired by mankind only a hundred generations ago. It is thus the new environment of modern man. It is one which we are still getting used to, and in which we sometimes are like legal aliens waiting for naturalization. The feeling of full franchise and citizenship in that new environment is a quest that is the unique hidden adventure of us all.

Julian Jaynes teaches psychology at Princeton. The ideas in this article are explained further in his book The Origin of Consciousness in the Breakdown of the Bicameral Mind.

Finding the Memory Switch

THE FLASHBACK PHENOMENON

Wilder Penfield, the late Canadian neurosurgeon, perfected a technique for treating epilepsy by keeping his patient conscious, under local anesthesia, while he mapped the brain's response to stimulation by a weak electrical current. By this method, he could localize the site of the epilepsy and make his surgical intervention precisely there. Over the years, Penfield found that this brain stimulation in the temporal lobe region sometimes plunged his patients back in time. Penfield recorded his observations in a 1950 book called *The Cerebral Cortex of Man*, from which the following passages are taken.

A young man, J.T., who had recently come from his home in South Africa, cried out when the superior surface of his right temporal lobe was being stimulated: "Yes, Doctor! Yes, Doctor! Now I hear people laughing—my friends—in South Africa." After stimulation was over, he could discuss his double awareness and express his astonishment, for it had seemed to him that he was with his cousins at their home where he and the two young ladies were laughing together. He did not remember what they were laughing at. Doubtless he would have discovered that also, if the strip of experience had begun earlier, or if the surgeon had continued the stimulation a little longer.

This was an experience from his earlier life. It had faded from his recollective memory, but the ganglionic pattern which must have been formed during that experience was still intact and available to the stimulating electrode. It was at least as clear to him as it would have been had he closed his eyes and ears 30 seconds after the event and rehearsed the whole scene "from memory." Sight and sound and personal interpretation—all were re-created for him by the electrode.

The experiential responses of the flashback variety were, for the most part, quite unimportant moments in the patient's life; standing on a street corner, hearing a mother call her child, taking part in a conversation, listening to a little boy as he played in the yard. If these unimportant minutes of time were preserved in the ganglionic recordings of these patients, why should it be thought that any experience in the stream of consciousness drops out of the ganglionic record?

When, by chance, the neurosurgeon's electrode activates past experience, that experience unfolds progressively, moment by moment. This is a little like the performance of a wire recorder or a strip of cinematographic film on which are registered all those things of which the individual was once aware—the things he selected for his attention in that interval of time. Absent from it are the sensations he ignored, the talk he did not heed.

Time's strip of film runs forward, never backward, even when resurrected from the past. It seems to proceed again at time's own unchanged pace. It would seem, once one section of the strip has come alive, that the response is protected by a functional all-or-nothing principle. A regulating inhibitory mechanism must guard against activation of other portions of the film. As long as the electrode is held in place, the experience of a former day goes forward. There is no holding it still, no turning back, no crossing with other periods. When the electrode is withdrawn, it stops as suddenly as it began.

Every individual forms a neuronal record of his own stream of consciousness. Since artificial reactivation of the record, later in life, seems to re-create all those things formerly included within the focus of his attention, one must assume that the reactivated recording and the original neuronal activity are identical. Thus, the recorded pattern of neuronal activity may be considered much more than a record, for it was once used as the final stage of integration to make consciousness what it was. One might suppose that originally, like a strip of film, its meaning was projected on the screen of man's awareness, and somehow it was held in place there for a brief time of consideration before it was replaced by subsequent experience and subsequent neuronal patternings.

Consciousness, "forever flowing" past us, makes no record of itself, and yet the recording of its counterpart within the brain is astonishingly complete. This counterpart, made up of the passing of potentials through the everchanging circuits of final integration, is recorded in temporal succession between the experience which went before and that which follows.

The thread of time remains with us in the form of a succession of "abiding" facilitations. This thread travels through ganglion cells and synaptic junctions. It runs through the waking hours of each man, from childhood to the grave. On the thread of time are strung, like pearls in unending succession, the "meaningful" patterns that can still recall the vanished content of a former awareness.

The nation's official memory bank is the National Archives and Records System, which holds more than 3,000,000,000 records in 22 buildings and is maintained by a $70 million annual budget and a staff of more than 3,000 people. Stored there are billions of pages of printed material, 5,000,000 still photographs, 82,000 reels of motion picture film, 70,000 sound recordings, 4,000,000 maps, charts and aerial photographs, and 5,000 hours of tapes from the Nixon White House. Shelved continuously, these records would stretch 2,482 miles.

Ultimate Memory Quiz

Below are 12 English-language words that have fallen out of common usage, though they survived through long periods of history. Try to provide the modern equivalents of these words. If you get 0-3 right, your performance is average. If you get more than 6 right—and you aren't a certified etymologist—you can try one of these explanations: (a) you are extraordinarily lucky; (b) language is an ongoing form of cultural consciousness with its own memory bank; (c) your recall from a previous incarnation must be guiding you.

The words come from Susan Kelz Sperling's book *Poplollies and Bellibones* (Crown) by way of Willard Espy, author of a recently published reminiscence called *Oysterville: Roads to Grandpa's Village.*

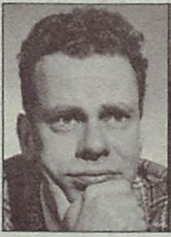
ANSWERS APPEAR ON PAGE 127

1. **Kew-kaw**
2. **Purfle**
3. **Bedswerver**
4. **Windsucker**
5. **Lip-clap**
6. **Quetch**
7. **Trundle-tail**
8. **Fadoodle**
9. **Downsteepy**
10. **Pitchkettled**
11. **Flag-fallen**
12. **Murfles**

Rancor and resentment are much more persistent than the feeling of gratitude. We remember once and for all the evil that has been done to us. We always demand new proofs of the good. This is true because it is much more difficult to forget and to pardon than to remember the vexations that we suffered.

—Eugene Minkowski
in *The Presence of the Past*

How Well Do You Remember the News?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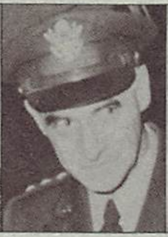
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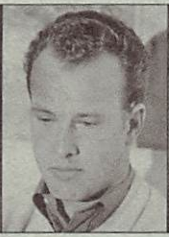
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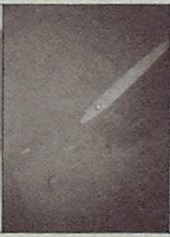
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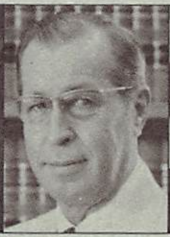
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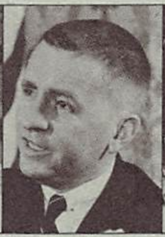
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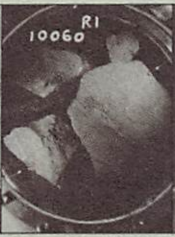

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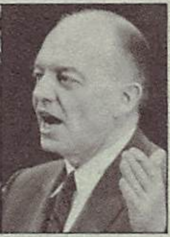
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WIDE WORLD PHOTOS

The news is a daily stream of names and faces, people who bring an issue to prominence, define a choice, symbolize an attitude, mark an accomplishment, or otherwise lay claim on the national attention over a period of days, weeks, or even months.

At the time, we cannot imagine the name or face will ever be unfamiliar again, so sharply is it drummed on our attention. Yet it slips away, yielding to the accumulation of newer, more immediate names and faces.

The following quiz will test your rate of memory decay for public personalities and events. The names and pictures here were all featured prominently and at length in the news media sometime between the mid-1940s and the early 1970s. You should be able to identify the people (a) by occupation, and (b) by the events that made them newsworthy.

9. Michael Collins
10. Henry Wallace
11. Fred Friendly
12. Ernest Gruening
13. David Lilienthal
14. Donald Schollander
15. Clark Kerr
16. Harry Bridges
17. Elizabeth McAlister
18. Bill Boyd
19. Edward Teller
20. Mary Ann Vecchio
21. Walter Hickel

ANSWERS APPEAR ON PAGE 127

Scoring. For each name or face correctly identified, score 2 points. Then adjust your total score according to your age: if you are under 25, add 8 points; between 26 and 34, add 5 points; between 35 and 45, add 2 points. Over 45 you are presumed not to need an age adjustment.

Results: If you score 40 points or over, you show little or no memory decay. You are no doubt often accused, with reason, of living in the past.

If you score 31 to 39 points, you show attenuated decay. You are known to say, "Why, I remember when you could buy a Hershey bar for a nickel."

If you score 24 to 30 points, you show moderate decay. While appreciating the past, you tend to live for today.

If you score 18 to 23 points, you show a high decay rate. Possibly you have trouble locating your house after an extended vacation trip.

If you score below 18 points, we advise you to try futurology.

Using Altered States of Consciousness to Improve Recall

by Marilyn Ferguson

Memory can be heightened in the so-called altered states of consciousness—daydreaming and reverie, hypnosis, meditation, moods of creative inspiration or unselfconscious intellectual excitement. These states seem to show more synchronous electrical activity in the brain, as well as a focused inner awareness and a sense of flow.

This focusing process may act like the fine-tuning of a radio or television set. Information once obscured by static begins to come through clearly.

There is strong evidence, for example, that the pinpoint awareness of hypnosis can open the gate to astounding realms of memory.

Dr. David Cheek, a San Francisco obstetrician and national authority on hypnosis, decided several years ago to see if people could remember and describe their births. He suspected that such accounts would be fantasy, nothing more. To his amazement, he observed that patients reliving their births made the same head and shoulder movements as a newborn "presenting" for delivery—a sequence of events no lay person would know. Many persons also recounted medical details that were later confirmed by their doctors.

Recently Cheek hypnotized three young people whom he had actually delivered as babies, then compared their reports with his own detailed 20-year-old records. They were uncannily similar.

Cheek even found that individuals who have undergone general anesthesia for surgery can sometimes recount, under hypnosis, conversations that took place in the operating room while they were apparently profoundly unconscious. Other researchers have shown that memory for events in the environment can be obtained from individuals who, by all physiological descriptions, were asleep when the events occurred.

A Bulgarian physician, Georgi Lozanov, has developed a powerful teaching method based on enhanced learning in altered states of consciousness. His technique, Suggestology, draws on yoga and hypnosis to create a relaxed attentive state in which students memorize information rapidly. They listen to classical music and do yogic breathing exercises while an instructor recites the subject matter. Students typically cover the equivalent of a one-year language course in three months, some with nearly perfect recall.

The state of Iowa has funded two projects to train teachers in the method, and Suggestology programs are being tested by the ministries of education in Canada, France, Sweden, and the U.S.S.R.

Even meditation alone seems useful for enhanced memory. Its sensory focus seems to bring about integration of brainwave activity, including unusual synchrony between the brain's two hemispheres. Several studies have shown that long-term meditation improves recall. Practice of the various meditative techniques—Zen, yoga, TM, as well as the various Western systems—seems to free the traffic between normal awareness and the rich territory of the unconscious. Meditation, indeed, aims to make the unconscious conscious.

Marilyn Ferguson wrote The Brain Revolution *and is editor/publisher of* Brain/Mind Bulletin.

Hologramic Mind

by Paul Pietsch

It seemed almost the setting for a seance or an exorcism. "Please step this way!" I was ushered through darkness to a stool in front of an emerald-green shaft of laser light. One of the experimenters inserted a photographic plate in the path of the laser beam. Suddenly, from nowhere, suspended in cosmic black space before me, there appeared a dissected human brain. But I knew for a certainty that the specimen could not possibly be there. It was one of my own class demonstrations. And I'd locked it up in a cabinet across the hall not moments before.

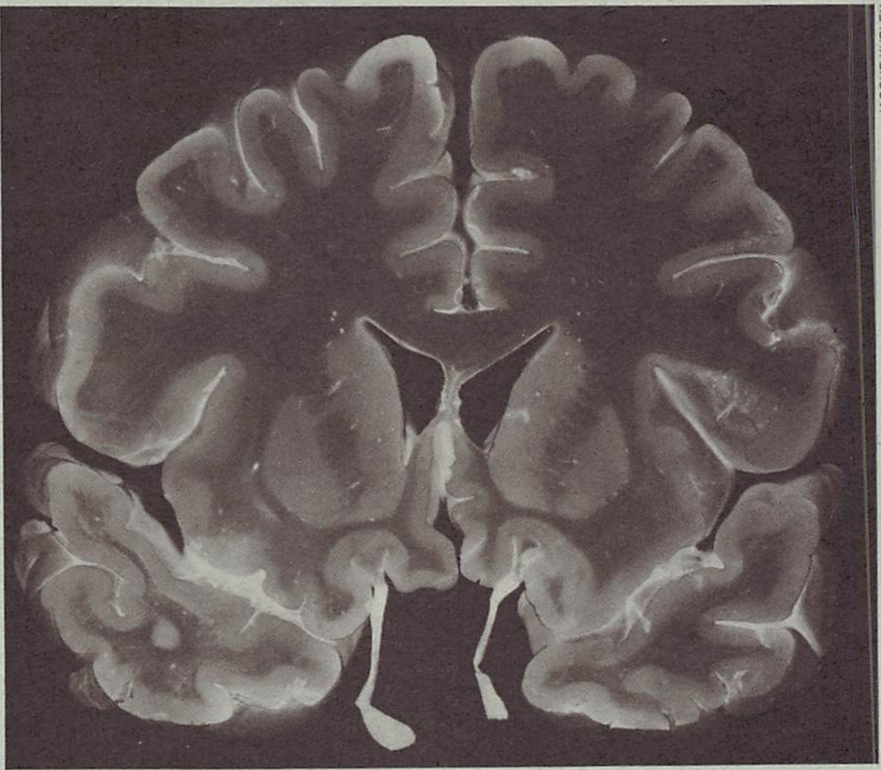
Yet I was seeing no photograph. When I shifted over to the left, I could see a side of the brain not visible from the front. Over on the right, or standing up, I got different perspectives. Moving in close, almost expecting to smell strong formaldehyde fumes, I could make out fine gridlike indentations that had been impressed by cheesecloth while the brain was still fresh and soft. Finally, I had to reach out and try touching the brain to convince myself that the thing itself really wasn't there at all.

I wasn't hallucinating or witnessing trick photography. Nor was the image an optical illusion, either. It was an image reconstructed from a hologram. A hologram encodes for the height of waves and how quickly points on the wave move from one place to the next. Called phase and amplitude, the two properties determine all else about waves, including any images or messages the waves may be transporting. (Photographs contain information only about amplitude.)

I understood what was going on in that room. I even knew the mathematical reasons why. It was science, not magic or supernatural laws at work. Yet the human being in me kept asking over and over again just what reality really was, anyway. For it wasn't only the uncanny hologram. It was the thought that before me might lie the basic secret of how that pickled brain across the hallway had once stored a living mind.

Theories are what make scientific revolutions happen. And we may just be in the early and uncertain rounds of one right now. For the abstract principles of the hologram form the basis of a theory to explain the brain's most elusive properties. *Hologramic theory*, an editor of mine once named it. And that's what I'll call it here.

Holograrnic theory was first proposed by physicists, not psychologists, physiologists, or anatomists. But the theory has been used by a number of behavioral and biological scientists during the past few years to account for many diverse paradoxes about the brain. The theory has predicted incredible results in many laboratories, including my own, and has led to new and unsuspected possibilities of brain and mind. And physical holograms may be used to model many features of mind that once seemed totally beyond the ken of science.



Cross-section view (in negative) of the human brain through the frontal lobes (about three fingers in front of where the band on a pair of earmuffs rests on the head).

A generation ago, psychologist Karl Lashley found that he could dim the recollections of laboratory animals by destroying parts of their brains. But it wasn't *where* he cut, it was *how much.* Lashley concluded that the engram, or memory trace, is distributed and repeated throughout the brain. He could never isolate the engram.

People's engrams have been equally elusive, although Lashley's doctrine may be too simplistic to cover the complex brains of humans, apes, and, perhaps, dolphins and whales. But his basic idea works, even in us. And his beliefs have been sustained by many different kinds of experiments, some conducted even by his critics. A physiologist named E. Roy John and his colleagues have learned how to detect active memory signals in the living brains of rats and cats; the same signals recur in vastly different regions of the brain, just as Lashley's doctrine predicts. And would you believe that shuffling a salamander's brain does not scramble the animal's mind? I might not, either, except that I did the research myself.

The diffuse hologram makes no more common sense than the brain itself. Cut the hologram in half and both halves still regenerate a whole scene. Try quarters, eighths—and it's the same thing! The reason is that a whole code exists at every point in the medium. The reasons are mathematical. But, basically, the hologramic code depends on ratios established within the medium, not absolute values. Like an angle, the code is relationships, abstract relationships, really.

At any rate, with very tiny pieces of a diffuse hologram, the regenerated image does blur, as did the memories of Lashley's animals. But the information itself doesn't degenerate. It's in the communication of it; the loss of fidelity is an effect of "noise" on the very weak signal a tiny piece of hologram generates; it's like what static does to a weak radio signal or snow to a dim TV picture. Physiologist John believes that signal-noise differences account for specialized functions in particular parts of the brain.

A subtle dilemma pops up in work such as Lashley's. If engrams are distributed everywhere, how does the same brain house more than a single memory? Holographers have produced what are called multiple holograms—codes of many different scenes superimposed one on top of the other right in the very same medium! How can this be? In theory the individual code can be made almost as

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Paul Pietsch teaches neuroanatomy at the University of Indiana School of Optometry.

small as a single geometric point. Thus on any piece of medium, the number of individual codes may approach infinity, in theory. In practice, multiple holograms actually exist.

In multiple holograms, the holographer keeps different scenes straight by manipulating such properties as color or the angle of the construction beam. Then, during decoding, by making comparable adjustments, the holographer can cause one whole scene to go off and another to come on—like an actor forgetting Othello so he can play Hamlet.

Consider, though, what happens if the holographer *doesn't* make adjustments during the coding process! During decoding, the holograms might act as though they had an imagination: scenes might merge that had never coexisted in physical reality at all. Or, depending on the scenes, the holograms might also act as though they were producing delirium tremens or were taking a trip on LSD.

The abstract principle in the hologram easily accounts for my shufflebrain experiments. Each code is not only whole, it is also *independent* of other codes—although codes cooperate in regenerating the image. Shuffling parts of the salamander's brain was like scrambling a deck of identical cards. But this independence principle would also allow new information to be fed into the deck. I've tested this prediction by transplanting brain parts. An operation can give a salamander thoughts originally taught to another salamander—or even the instincts of fishes or frogs.

Actually, some 200 reports exist alleging that memory may be transferred in chemical form from one rat to another—or even from a rat to a hamster! This is a very controversial subject, and it would take me a book to do justice to both sides. But one big imponderable used to be how a tiny molecule might store all the information required to make a memory. Hologramic theory doesn't settle the controversy. But holograms would have no trouble fitting on a molecule, in theory, at least.

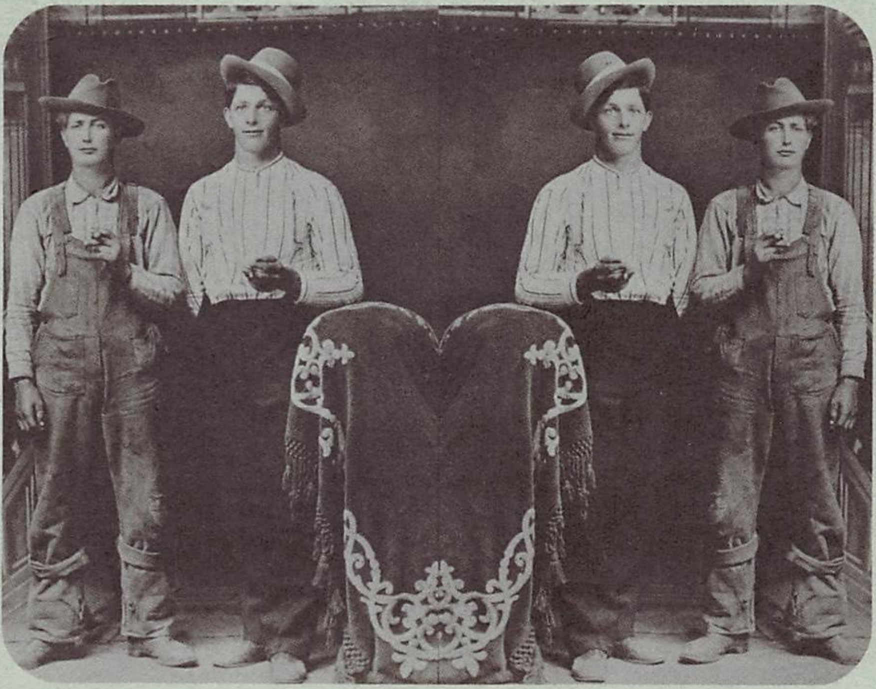
There is evidence of memories on molecules. The most convincing case has come from studies of decision-making and memory in bacteria, believe it or not, organisms that don't even have brains. But there's this major obstacle against reducing mind to molecules—and this extends to the chemical transfer of memory, too: the facts. Some physiologists have found no chemical changes associated with learning. Hologramic theory suggests reasons for such discrepancies, some mathematical, others that can be seen by way of physical simulation. Let's look at an example of the latter.

There are acoustical holograms—holograms made from sound instead of light. The information is gathered with a microphone and the code is displayed on a TV tube. It's possible to photograph the hologram for permanent storage, should someone pull the TV plug or change scenes.

Short- and long-term memory might work analogously. Or the transition from visual to some other mode might be modeled as follows. It is possible to shine a light through the photograph and visually regenerate a scene originally encoded by sound. But consider this question: Where is the hologram? In the air near the microphone? In the vibrations of the microphone? In the electronics of the set? On the tube? In the photographic film? The answer is that it is in all these places. For the hologram is information. It is abstract relationships. The same code can exist in vastly different kinds of media and depend on different mechanisms—just as an angle of 30 degrees may be formed from ivory, mahogany, or extruded aluminum.

Hologramic theory does not free mind from media. It is no new variant of mind-body dualism. But the theory's most far-reaching implication is that many different mechanisms and media can store the same codes. Stored mind is not thing. It is abstract relationships produced by things. In the sense of ratios, angles, square roots, mind is a mathematic. No wonder it's hard to fathom.

Funes the Memorious, in a story by Jorge Luis Borges, remembered "the shape of the clouds in the south at dawn on the 30th of April of 1882, and he could compare them in his recollection with the marbled grain in the design of a leather-bound book which he has seen only once, and with the lines in the spray which an oar raised in the Rio Negro on the eve of the battle of Quebracho."



WISCONSIN HISTORICAL SOCIETY

Counting Cracks

I'm always counting things and remembering them. It's screwy, but it helps keep my mind occupied. I may count the cracks on a basketball floor, or the number of people in the stands who're wearing red, the tiles on a ceiling, the number of steps on a stairway. I've even counted and remembered the painted strips of white highway lines—I'm sure you'll be thrilled to know that there are 132 broken white lines per mile on most major highways in 47 of the 50 states. Whenever I return to a basketball court, stairway, highway—I'll still know the number of cracks, steps, and stripes.

—Jerry Lucas in *The Memory Book*

Memorizing Ain't Necessarily Learning

by DONALD SCHWARTZ

Recently a respected author wrote an essay about the value that comes from memorizing great poetry in school. That got me thinking, both of what I had to memorize 40 and 50 years ago as a schoolboy, and what I forced others to memorize during 25 years as a teacher. I am not proud, on either count.

Today I can tell you that Antofagasta and Iquique are ports for shipping nitrate—courtesy of some long-departed geography teacher in grade six. I can recite without hesitation the opening lines plus selected passages from "Snowbound," along with the "quality of mercy" speech by Portia from *The Merchant of Venice*, and miscellaneous stray stanzas from Edgar Guest, Ella Wheeler Wilcox, Joyce Kilmer, W. E. Henley, and Henry Wadsworth Longfellow, among others. I can give you the multiplication tables up to 12, the names of the presidents through Hoover, the dates of the Battle of Hastings and Magna Carta. All of these items I once had to memorize in school. I do not consider them particularly memorable, however.

It's significant that even now I cannot remember the various things I required several generations of students to memorize. I only hope the quality was a little higher: excerpts from Tom Jefferson's First Inaugural, perhaps; certain passages from Shakespeare here and from Yeats there. I am not particularly confident of the merit of my selections, and I am somewhat ashamed of having inflicted such assignments on defenseless students, several of whom grew up to be professors of literature.

Not that inspirational thoughts or exalted language are bad in themselves. It is simply that the long-term utility of great poetry is so very meager. All the memorization I did in childhood that signified was done out of school—the batting averages of the 1930 Brooklyn Dodgers' lineup (including not one but three left fielders: Rube Bressler, Harvey Hendrick, and Ike Boone), the 1920 telephone number of my father's New York City store (Barclay 9932), the brand names of countless American cigars (the result of a truly handsome collection of cigar bands), verses that could be used as weapons against childhood playmates ("Marguerite, go wash your feet, the Board of Health is across the street!"), the roll call of American motor cars (Auburn to Zephyr) employed in playing our favorite alphabetical game. As Marianne Moore points out, "one discovers . . . a place for the genuine."

Last spring I was asked to speak at the 50th anniversary ceremonies of a school I attended from 1932 to 1936. I was introduced by my old Latin teacher, who later became a famous headmaster. Responding to his introduction, I stated, "One day in Latin class Ralph Rutenber was trying to drill the notion of the ablative absolute into me. I didn't even want to understand the relative, let alone the absolute. Ralph shook his head in dismay and then said, 'Schwartz, two years, five years from now you won't remember a thing about the ablative absolute. But it's the discipline of Latin you won't forget.' So, naturally, the only thing I remember is the ablative absolute. And I must say, it comes in handy every 40 years or so, like tonight." Whereupon I proceeded to deliver an address on that very subject. As Lewis Carroll's Queen says in *Alice Through the Looking Glass*, "It's a poor sort of memory that only works backwards."

Once I had a black student in an English class who got into disciplinary trouble with his black music teacher. Trying to soothe the situation, I remarked, "Kevin, how come you accept my criticism about your grammar but you won't accept your music teacher's choice of choral selections?" Kevin looked at me thoughtfully and then said with impeccable logic, "When you criticize my English, I know it will help me get in a good college, and after college, to get me a good job. But when I go for that job interview, who is ever gonna ask me if I can sing a Christmas carol *in French*?"

I can't remember (sorry) who said, "Education is what you have left, after you've forgotten everything you learned in school." I do remember it was Joubert who said, "Education does not consist merely in decking the memory . . ." And decking the memory seems even less appropriate in a computer age when machines can be programmed to store and retrieve information that formerly had to be memorized by humans. Obviously there is some connection between memorizing and the truly memorable. Unfortunately, it is not the connection that teachers like to think they make for their students.

During the past five years I have worked in Harlem. My job includes listening to the voices of hard-core heroin addicts, a subculture with a lively oral tradition and therefore with keen memories. And I have been struck not so much by the poverty of their vocabularies as by the poetry that laces much of that language.

Although memory is commonly said to be of the past, one can remember facts about the future ("I just remembered that there will be a meeting tomorrow"), facts about the present ("I just remembered that the debate is going on right now"), scientific laws and generalizations, and timeless truths of logic and mathematics. —ENCYCLOPEDIA OF PHILOSOPHY

Harlem children do not grow up in public school easily memorizing the king's English. They do grow up readily memorizing the language of the street, a tough metaphoric *lingua franca* whose origins are in the bathroom and bedroom, in prison and storefront churches. It is a language usually imaginative, frequently musical, occasionally beautiful.

One night a few years ago a pair of street youngsters named Marcus and Marcellus wandered into the storefront where I then worked. They saw a blackboard and asked, "You a teacher?" I confessed. "Hey, let's play school," said Marcus delightedly. "Learn us something," implored Marcellus. Sadly I had to inform him that the best I could do was teach them; they would have to learn themselves.

Some day we teachers may have the sense to ask such children to memorize the best of their own poetry instead of Polonius's advice to Laertes. For, as Ezra Pound suggests, "What thou lovest well remains, the rest is dross."

Donald Schwartz works in a Harlem drug program.

WISCONSIN HISTORICAL SOCIETY

Taking Oral History

David McCullough is a writer of histories, his most recent book the story of the building of the Panama Canal, *The Path Between the Seas.* McCullough's method places large importance on interviews with survivors of the times he chronicles. So we called him up to ask how he uses the individual memory as a historical resource. He responded kindly and at length. . . .

Sometimes people will tell you something that you know damn well can't be true. But then you begin to wonder, and if you have any kind of conscience you inevitably find yourself trying to pin the thing down.

Doing research for my first book, on the Johnstown flood of 1889, I was talking to an old man on a front porch in a tiny Pennsylvania coal town. The man was in his 90s and blind. But he said he was at Southport Dam at the time it broke. Then he said, "They always called that place three-mile dam [meaning the lake behind the dam was three miles long], but that lake wasn't any more than two miles long."

Well, every account written until then, every authoritative thing I had read, said that lake was three miles long. And here was this old man saying that was wrong. So I sent to the Department of the Interior and got geological elevation maps of the area, and I was able to trace around contour lines and get a profile of the lake as it had existed. And, sure enough, he was exactly right. The lake was considerably smaller than anyone had thought previously.

When you think about it, that's a pretty important fact—the volume of water coming down on the town, causing all this tremendous damage, was a good deal less than people realized. It makes the force of that water all the more awesome. So you just can't write off these old memories as the fuzzy ramblings of dim old minds. Often they may be that. But by dismissing them you not only run the risk of being inaccurate—and books stay in print a long time—but you also, more importantly, deny some of the life-force that has to be in history.

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My best interview for the Panama Canal book was a man with very little formal education who by all conventional indexes would be assumed to have very little to say. He spent most of his life as a custodian. He was in Panama when the canal was being built, but he saw almost nothing of what was going on—like the classic character who's present at a momentous event but sees practically none of it. But he had an exquisite memory for the details of life around him, the people, the atmosphere, the day-to-day life. His curiosity was so alive—still is—that he was able to give me material that otherwise would have taken another five years of research—that is, if I could have gotten it from books at all.

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The great advantage of finding a survivor of the past is that he can see the experience of that old event against the present. He can give you a relationship between what was and what is that you simply cannot get any other way.

WISCONSIN HISTORICAL SOCIETY

Again and again from people I interview I get glimpses into character, the perfectly marvelous telling example, that gives a dead human personality back again. Take William Crawford Gorgas, the doctor who succeeded in ridding the Canal Zone of yellow fever. A fellow physician who knew Gorgas well described for me once how he saw Gorgas give a penny to a beggar in Panama. Gorgas was a man of such tremendous charm and courtly manners that the beggar didn't mind at all that he only received a penny—Gorgas had presented it in such a fashion, made such a ceremony of the occasion, that the beggar had been warmed far more by the man than by what the man was giving him. And it was a recollection like that that began to give me Gorgas the human being as distinct from his accomplishments.

What makes old age hard to bear is not a failing of one's faculties, mental and physical, but the burden of one's memories. —Somerset Maugham

Answers
TO NEWS TEST/P. 123

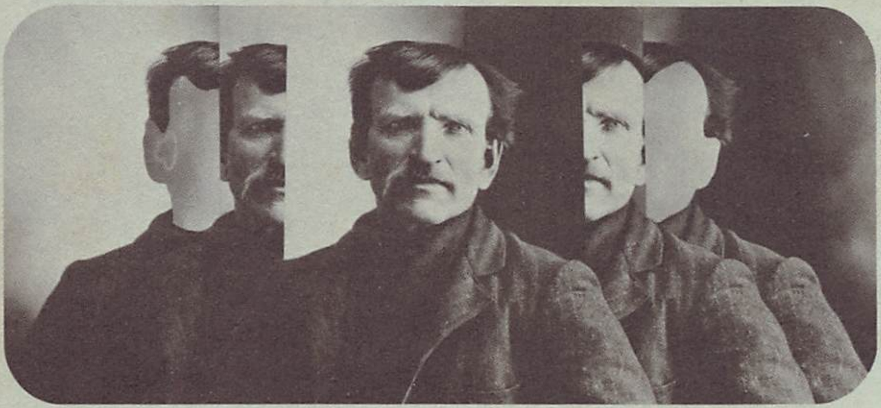
1. **Charles Van Doren,** academic, involved in the TV quiz game scandal.
2. **Lucius Clay,** general, U.S. Army, military administrator in Germany during Berlin airlift.
3. **Paul Hornung,** athlete, back for Green Bay Packers, suspended by NFL for betting on games and associating with gamblers.
4. **Thresher,** U.S. nuclear submarine that sank off East Coast.
5. **Clement Haynsworth,** judge, Nixon Supreme Court nominee rejected by Senate.
6. **H. Ross Perot,** businessman, attempted to ransom American POWs from North Vietnam.
7. **Moon rocks,** returned by Apollo 11 astronauts.
8. **Harold Stassen,** politician, perennial candidate for office including Presidency.
9. **Michael Collins,** astronaut, orbited moon while other crew members made first landing on surface.
10. **Henry Wallace,** politician, Vice-President under Roosevelt and third-party candidate for President in 1948.
11. **Fred Friendly,** former president of CBS News who resigned when the network refused to carry Vietnam war hearings.
12. **Ernest Gruening,** U.S. senator from Alaska who cast one of two negative votes on Gulf of Tonkin resolution.
13. **David Lilienthal,** administrator, chairman of the TVA and the Atomic Energy Commission.
14. **Donald Schollander,** athlete, won four gold medals in swimming in 1964 Olympics.
15. **Clark Kerr,** academic, president of the University of California system at time of Free Speech Movement.
16. **Harry Bridges,** labor leader, president of West Coast Longshoreman's Union and subject of many investigations into his political loyalties.
17. **Elizabeth McAlister,** nun, charged with plotting to kidnap Henry Kissinger.
18. **Bill Boyd,** actor, played Hopalong Cassidy.
19. **Edward Teller,** scientist, led group that developed H-bomb.
20. **Mary Ann Vecchio,** student, present at Kent State killings and symbol of student reaction to war and shootings.
21. **Walter Hickel,** politician, Secretary of Interior in first Nixon Cabinet, fired for his views on Vietnam.

All improvement of memory consists in the improvement of one's habitual methods of recording facts.

—William James

Answers
TO ULTIMATE MEMORY QUIZ/P. 122

1. Upside down
2. To adorn, decorate
3. Adulterer
4. Covetous, envious person
5. A kiss, kissing
6. To moan or twitch in pain
7. Mongrel dog
8. Nonsense
9. Precipitous
10. Puzzled
11. Unemployed
12. Pimples, freckles



WISCONSIN HISTORICAL SOCIETY

Forgetting as Self-Forgiveness

by T George Harris

The human brain has often been compared to that noble artifact, the computer, a machine that can remember anything in the world, it is said, if some programmer has the patience to store enough data in the memory bank. Such comparisons generally end up making the mind look stupid. Our memory banks are not perfect. We forget things.

Worse yet, our forgettings not only raise doubts about the brain's efficiency but can, in some circles, rouse suspicion of sin. The followers of Sigmund Freud make a big do about the things we forget. If we repress from the conscious mind the things we wish we hadn't done or learned, as Freud believed, then whatever we forget must smell of guilt.

Here's the ultimate self-incrimination. If our minds take the Fifth Amendment, unable to recall the fears and guilts of childhood, then it is assumed that as adults we are driven by an unconscious that is full of repressed horror. To escape the charge, men and women in psychoanalysis spend years on the couch perfecting their memories of childhood. The ideal patient can never, ever forget anything that was unpleasant.

Other psychologists have given the screw another turn. Their research shows that the brain can forget something even before it learns it. By "selective perception," as they call it, the mind often screens out threatening facts: since we don't notice them, we don't have to go to the trouble of forgetting them. Researchers like Irving Janis at Yale have found that such processes work even better among groups of people. A committee can become so skilled at a "group-think" kind of process that nobody asks the unpleasant questions or notices the facts that would make them all squirm.

Human memory has many other foibles, and hundreds of Ph.D.s and near Ph.D.s are now checking out one after another. Often shaking their heads and clucking their tongues, they use advanced scientific techniques to see why it is we can't remember like a computer—you know, be reliable. Others, like Gordon Bower at Stanford, have come up with ways to trick the brain into remembering whatever you want it to. The psychopharmacologists have been in the act a long time, trying to find chemicals that will improve memory. One psychologist even tried cannibalism: he fed some educated worms to ignorant worms and claimed that the dummies got smarter.

Much as I admire all this research and theory, I'm afraid my friends in psychology have, as Mark Twain would say, got hold of the wrong end of the stick. Not one of them, as far as I know, has recognized the virtues of forgetting. It's about the only form of self-forgiveness that most people have left. Do something you'd just as soon forget, and the brain often obliges. It buries the sour act so far back in the dead file that you may not run across it for years.

The church used to provide such a convenience. In the confessional, the sinner or the failure spilled his troubles to an invisible priest and bet on the doctrine of forgiveness. "Go forth and sin no more." Protestants put a higher premium on forgiveness by making the confession more public; the whole community got to savor the sin. But either way, the treatment brought release from the burden of guilt.

Now that the brain has to do most of the self-forgiving, it's time we recognized some of its remarkable capacities. Researchers are just beginning, for instance, to understand how we use dreams to work out the joys and agonies of life. Every hour and a half during the night, our eyes shift rapidly back and forth while we run through creative newscasts of the things that trouble us. We'd be leaping around the room if the brain weren't smart enough to paralyze the rest of the body. The longer we sleep, the longer our dreams run, until they take up a considerable share of the 90-minute cycle.

If someone stops us from dreaming, as curious psychologists have done in experiments, the human system goes totally out of whack. The best theory around says that our dreams are working through the memory banks to build some kind of coherent view of our lives. They are washing out the dirty underwear of experience and sending us back, cleaner if still not tidy, into the new day.

The more we know about the brain, the more we understand how it launders our memory and perhaps provides the chance to transcend the mundane in our search for meaning, for a notion of what we're here for. The brain is a cunning gadget that forever reaches beyond the mechanical form of memory. Mine is overly kind to me, often helping me forget the silliest acts of the day before. For these convivial features of its design, I can only be enduringly grateful.

In fact, the psycholinguists have been facing up to several things that are wrong with the computer ideal of memory. The smartest computer yet made, programmed by squads of clever scientists, can just about work its way up to baby talk. None has yet developed the genial capacity to forget the garbage that would, if kept where I'd always smell it, leave me unable or unwilling to take another try at the strange puzzles of existence.

George Harris, for many years editor-in-chief of Psychology Today, *is a Contributing Editor of* Quest/77.

Platonic Memory

Memory, Plotinus held, is for those who have forgotten. The doctrine is Platonic: For those who have forgotten, remembering is a virtue; but the perfect never lose the vision of truth and they have no need to remember. Hence there is a difference between memory and recollection. The Gods of whom the Buddha spoke in the *Dīghanikāya*, who fell from heaven when their memories were troubled, were reincarnated as men. Some of them practiced asceticism and meditation, and by virtue of their yogic discipline succeeded in recollecting their former lives. A perfect memory, then, is superior to the ability to recollect. In one way or another, recollecting implies having forgotten, and in India, as we just saw, forgetting is equivalent to ignorance, slavery (captivity), and death.

—Mircea Eliade, *Myth and Reality*, 1963 (Harper & Row, N.Y.)

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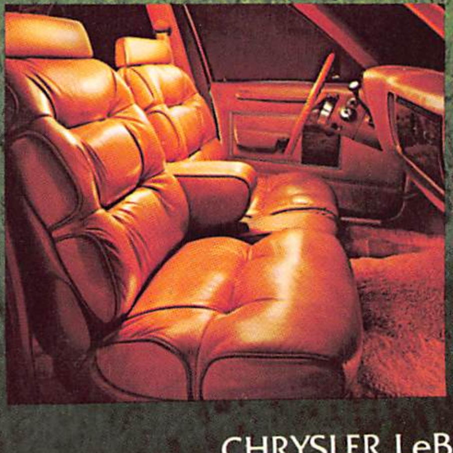

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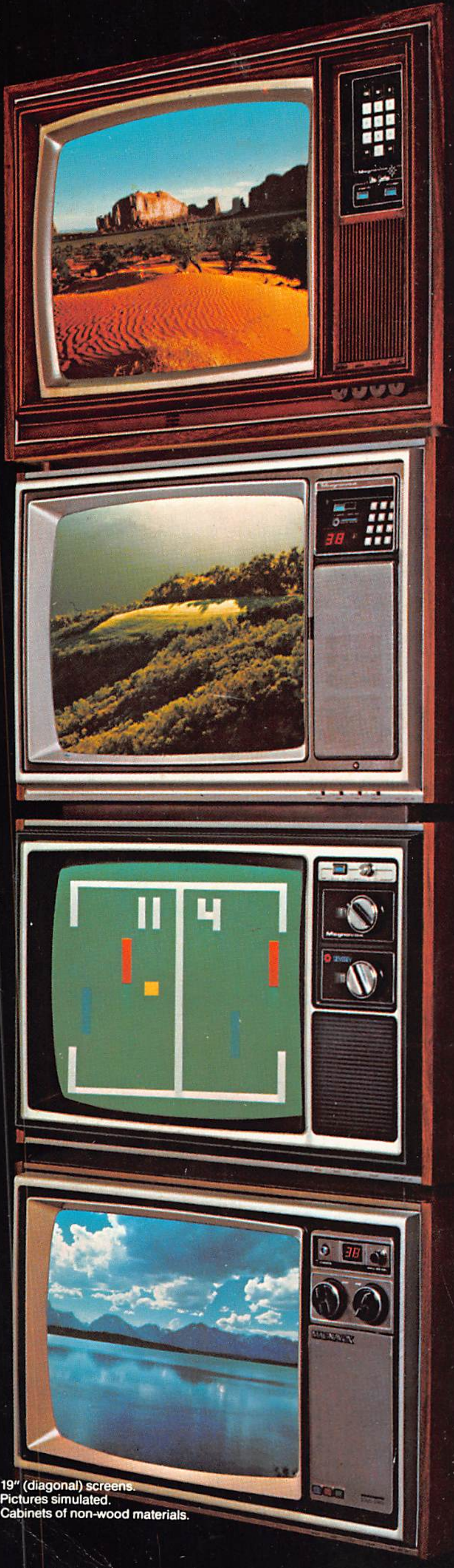

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